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(54) METHODS AND SYSTEMS FOR PRESENTING A VIRTUAL REPRESENTATION OF A REAL CITY

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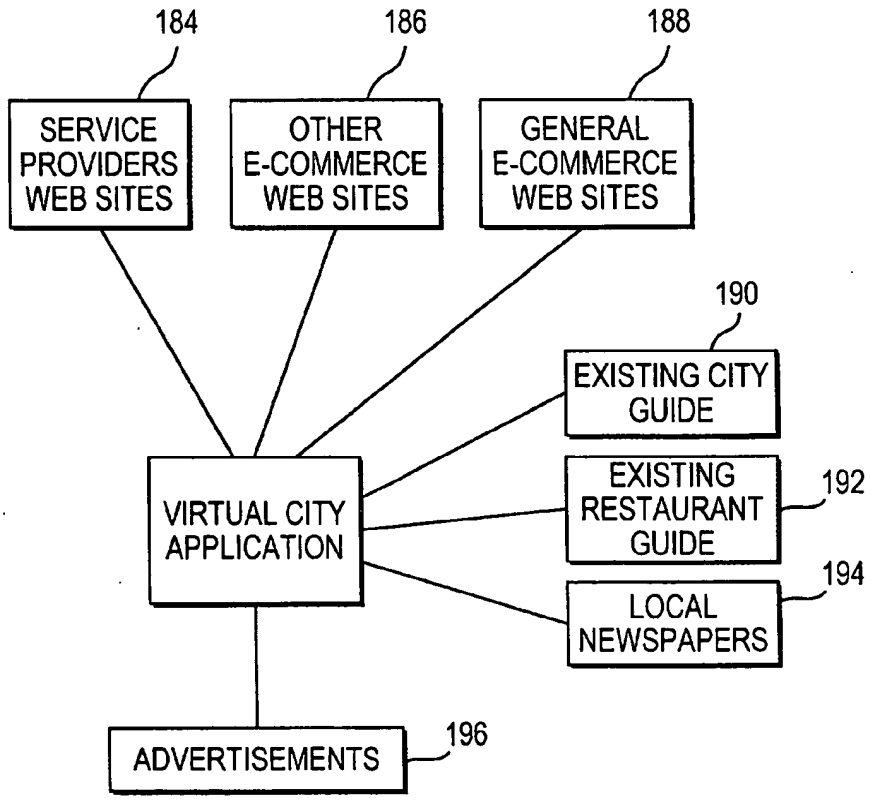
(57) ABSTRACT

A virtual city service that provides access to a virtual city application is provided. Users may navigate among a virtual representation of a real region, such as a city. The interface may include images of actual city blocks that have interactive items of interest such as storefronts. Users may virtually shop in the stores that adorn the virtual city blocks. The virtual city application may process orders for all merchants—local or web-based. An artificial intelligence component may be used in the form of a back-end linear programming model to provide an intelligent personal assistant. Chore-management may thus be automated.



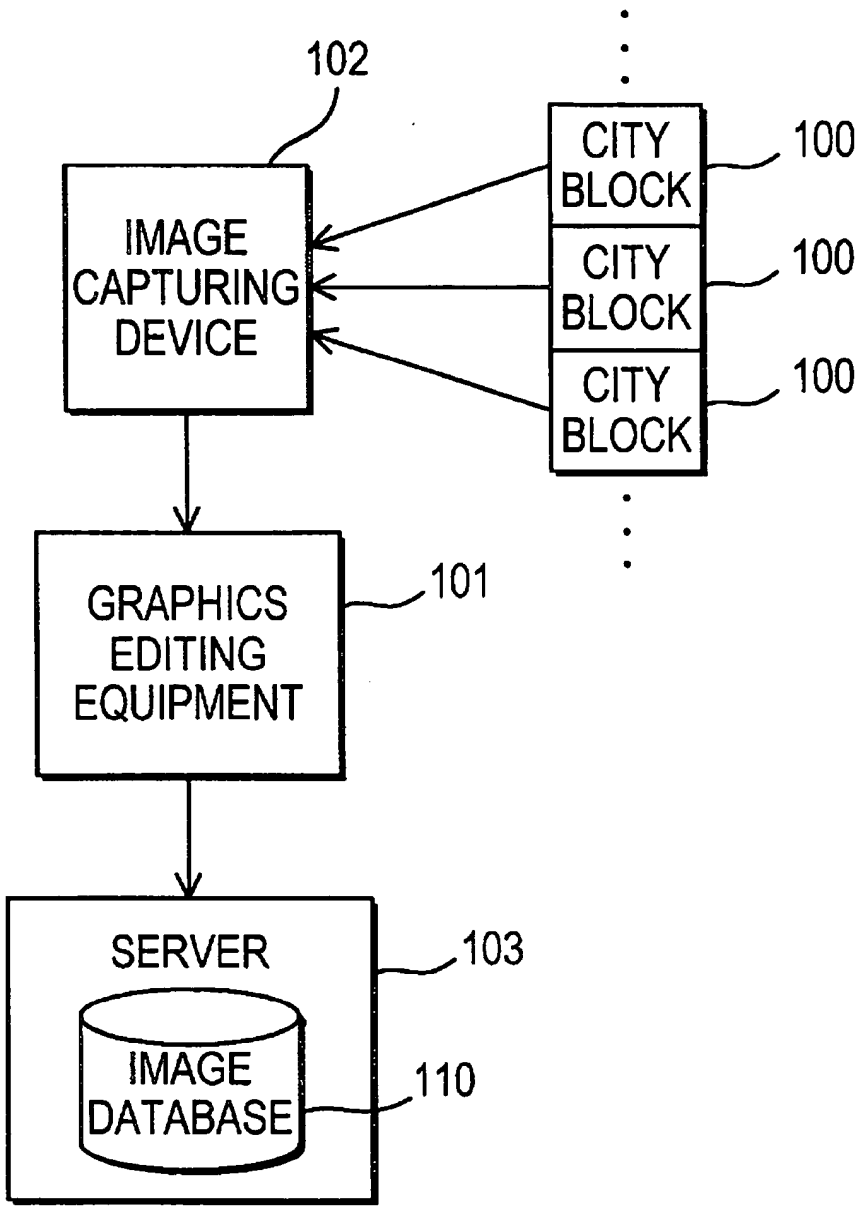

102
CITY BLOCK
100
CITY BLOCK
100
CITY BLOCK
100
IMAGE CAPTURING DEVICE
GRAPHICS EDITING EQUIPMENT
101
SERVER
103
IMAGE DATABASE
110

FIG. 1A

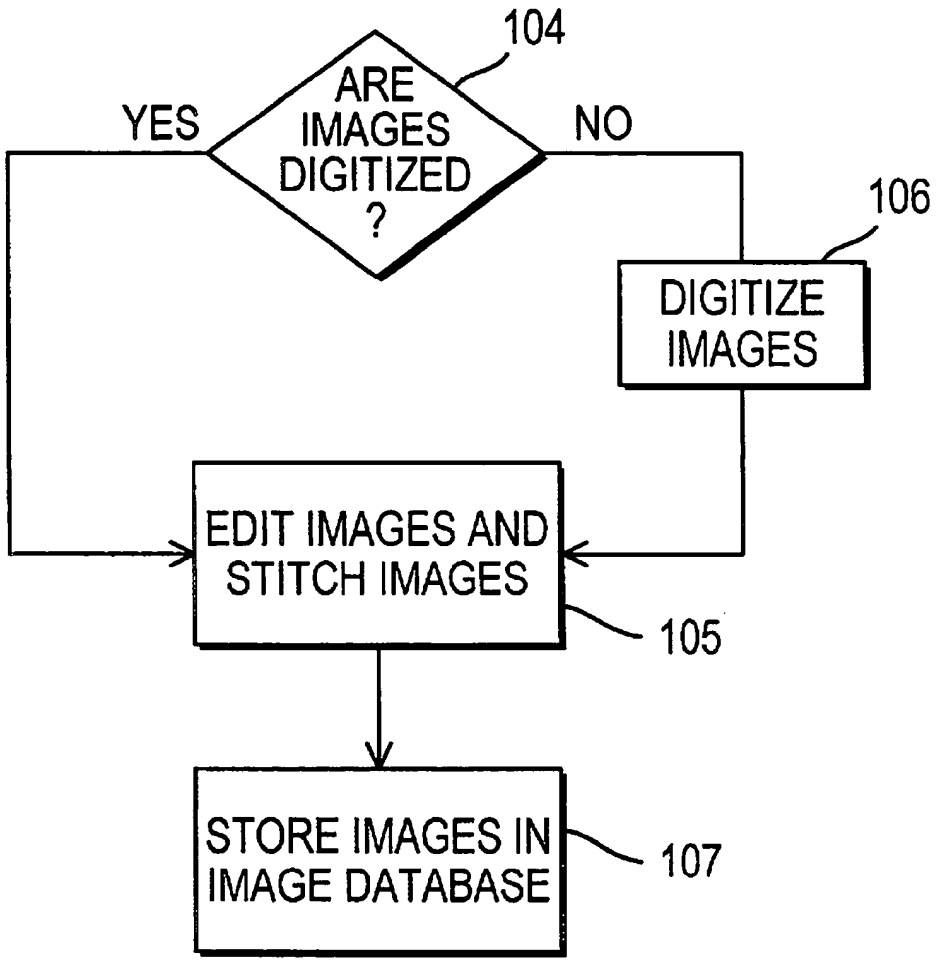

104
ARE IMAGES DIGITIZED ?
YES
NO
106
DIGITIZE IMAGES
EDIT IMAGES AND STITCH IMAGES
105
STORE IMAGES IN IMAGE DATABASE
107

FIG. 1B

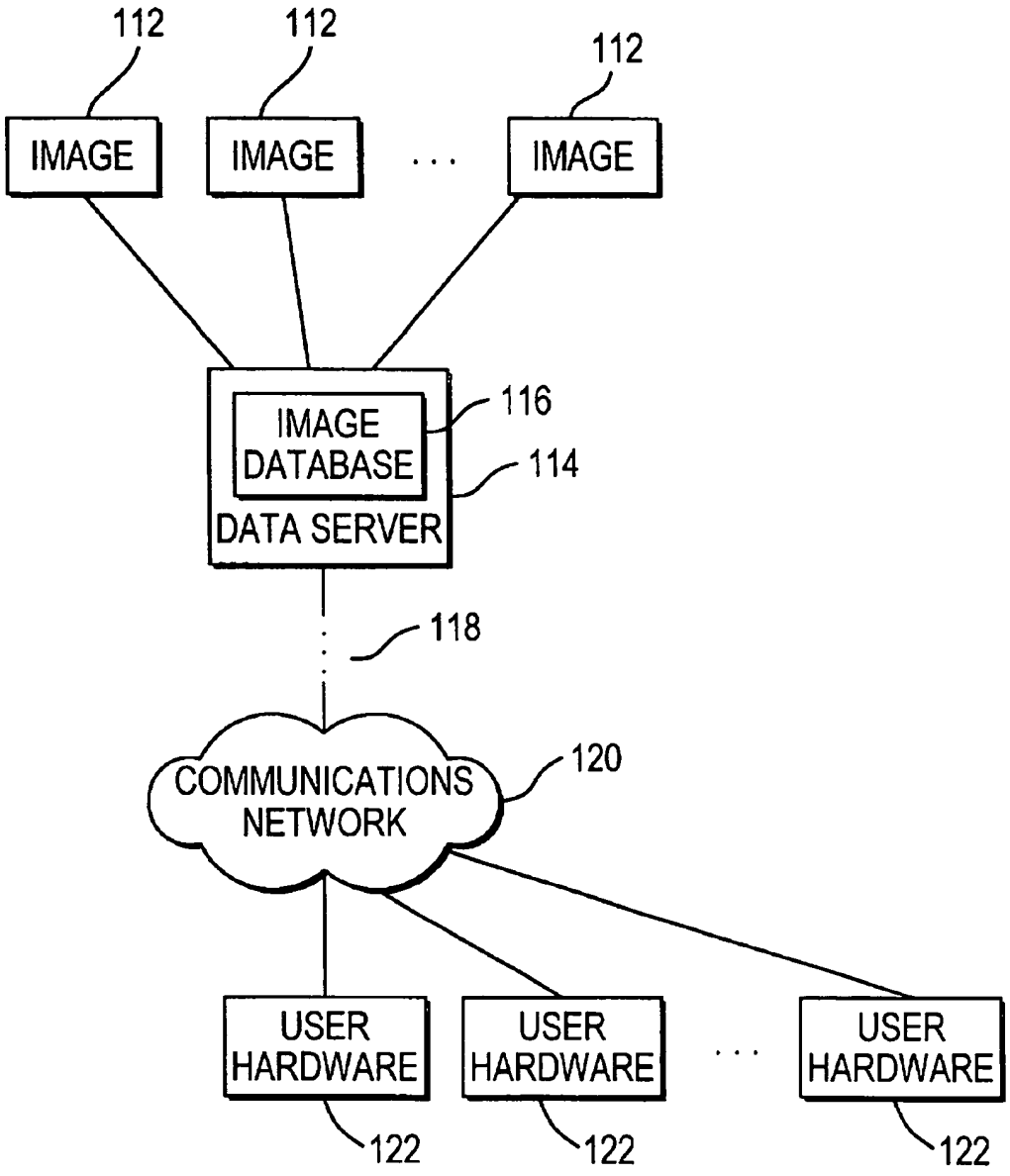

112
112
112
IMAGE
IMAGE
IMAGE
IMAGE DATABASE
DATA SERVER
116
114
118
COMMUNICATIONS NETWORK
120
USER HARDWARE
USER HARDWARE
USER HARDWARE
122
122
122

FIG. 2

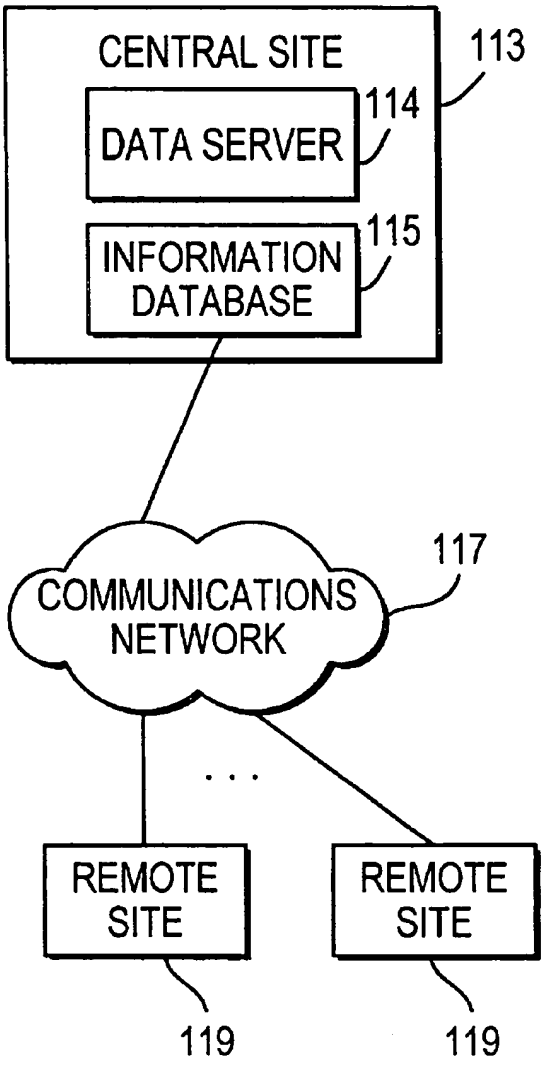

CENTRAL SITE
113
DATA SERVER
114
INFORMATION DATABASE
115
COMMUNICATIONS NETWORK
117
REMOTE SITE
REMOTE SITE
119
119

FIG. 3

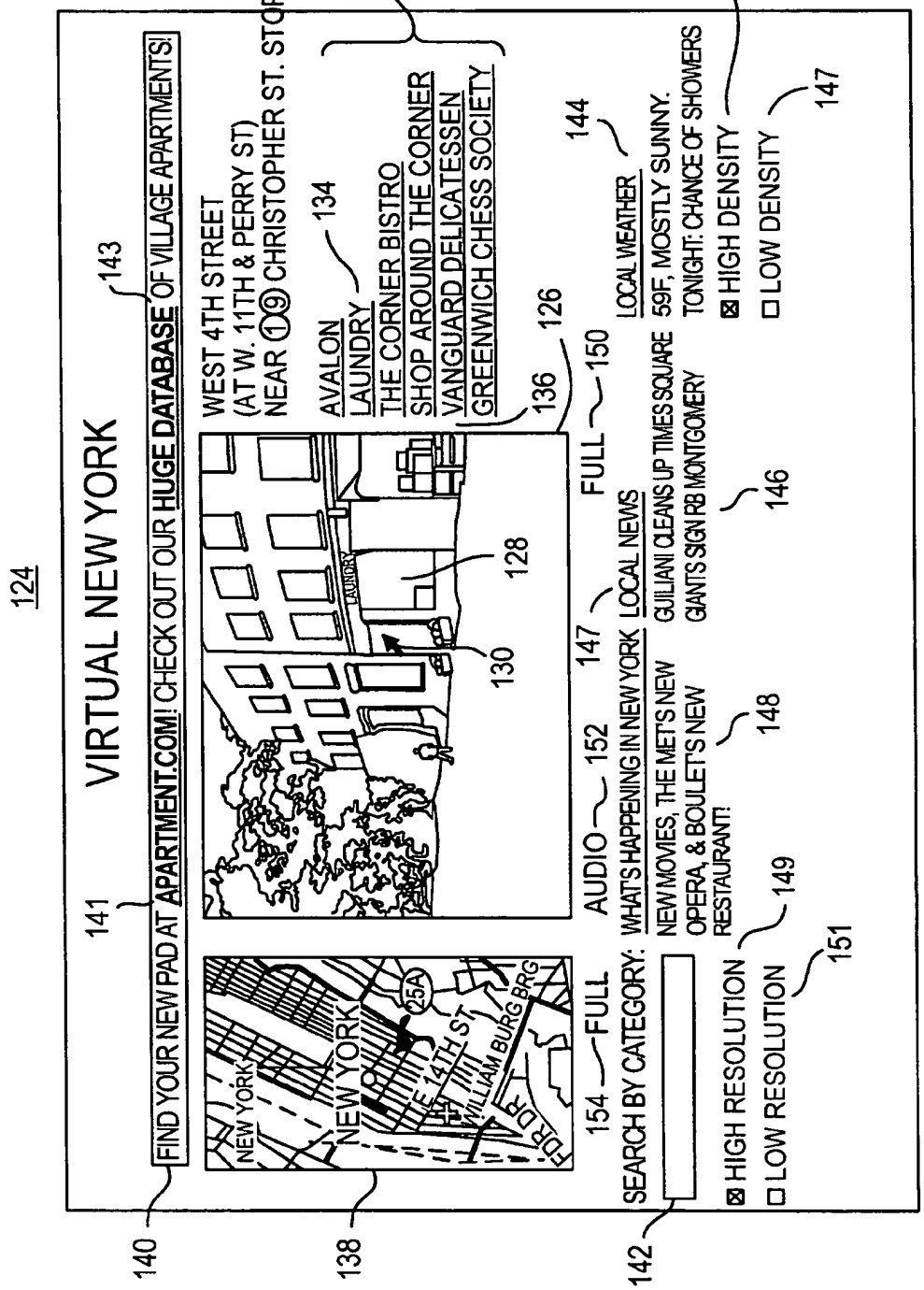
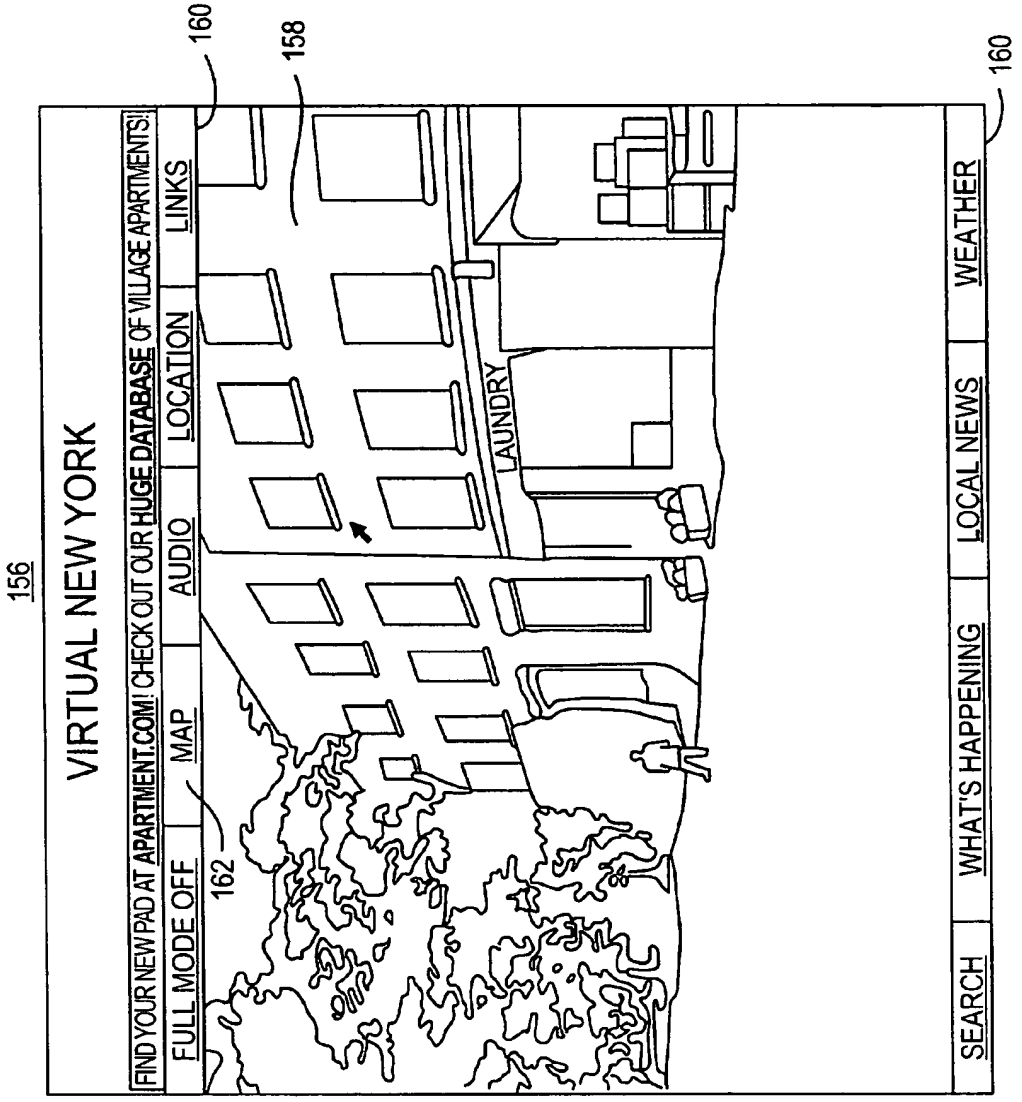

124
VIRTUAL NEW YORK
141
143
FIND YOUR NEW PAD AT APARTMENT.COM! CHECK OUT OUR HUGE DATABASE OF VILLAGE APARTMENTS!
WEST 4TH STREET
(AT W. 11TH & PERRY ST)
NEAR 1 9 CHRISTOPHER ST. STOP
132
AVALON
LAUNDRY
134
THE CORNER BISTRO
SHOP AROUND THE CORNER
VANGUARD DELICATESSEN
GREENWICH CHESS SOCIETY
136
126
128
130
144
LOCAL WEATHER
59F, MOSTLY SUNNY.
TONIGHT: CHANCE OF SHOWERS
145
HIGH DENSITY
LOW DENSITY
147
150
FULL
AUDIO
152
154
FULL
147
LOCAL NEWS
GULIANI CLEANS UP TIMES SQUARE
GIANTS SIGN RB MONTGOMERY
146
WHAT'S HAPPENING IN NEW YORK
NEW MOVIES, THE MET'S NEW OPERA, & BOULET'S NEW RESTAURANT!
148
SEARCH BY CATEGORY:
HIGH RESOLUTION
LOW RESOLUTION
149
151
140
138
142
NEW YORK
25A
14TH ST
WILLIAM BURG BRG
FDR DR

FIG. 4

FIG. 5


156
VIRTUAL NEW YORK
FIND YOUR NEW PAD AT APARTMENT.COM! CHECK OUT OUR HUGE DATABASE OF VILLAGE APARTMENTS!
FULL MODE OFF
MAP
AUDIO
LOCATION
LINKS
160
158
162
LAUNDRY
SEARCH
WHAT'S HAPPENING
LOCAL NEWS
WEATHER
160

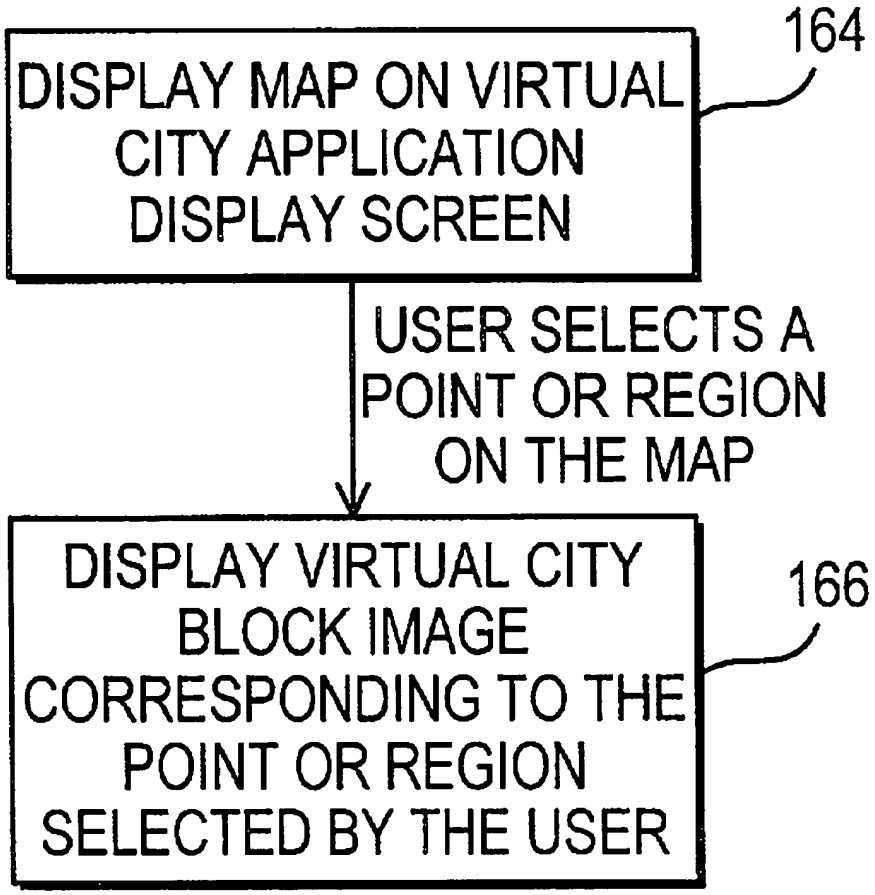

DISPLAY MAP ON VIRTUAL CITY APPLICATION DISPLAY SCREEN
164
USER SELECTS A POINT OR REGION ON THE MAP
DISPLAY VIRTUAL CITY BLOCK IMAGE CORRESPONDING TO THE POINT OR REGION SELECTED BY THE USER
166

FIG. 6

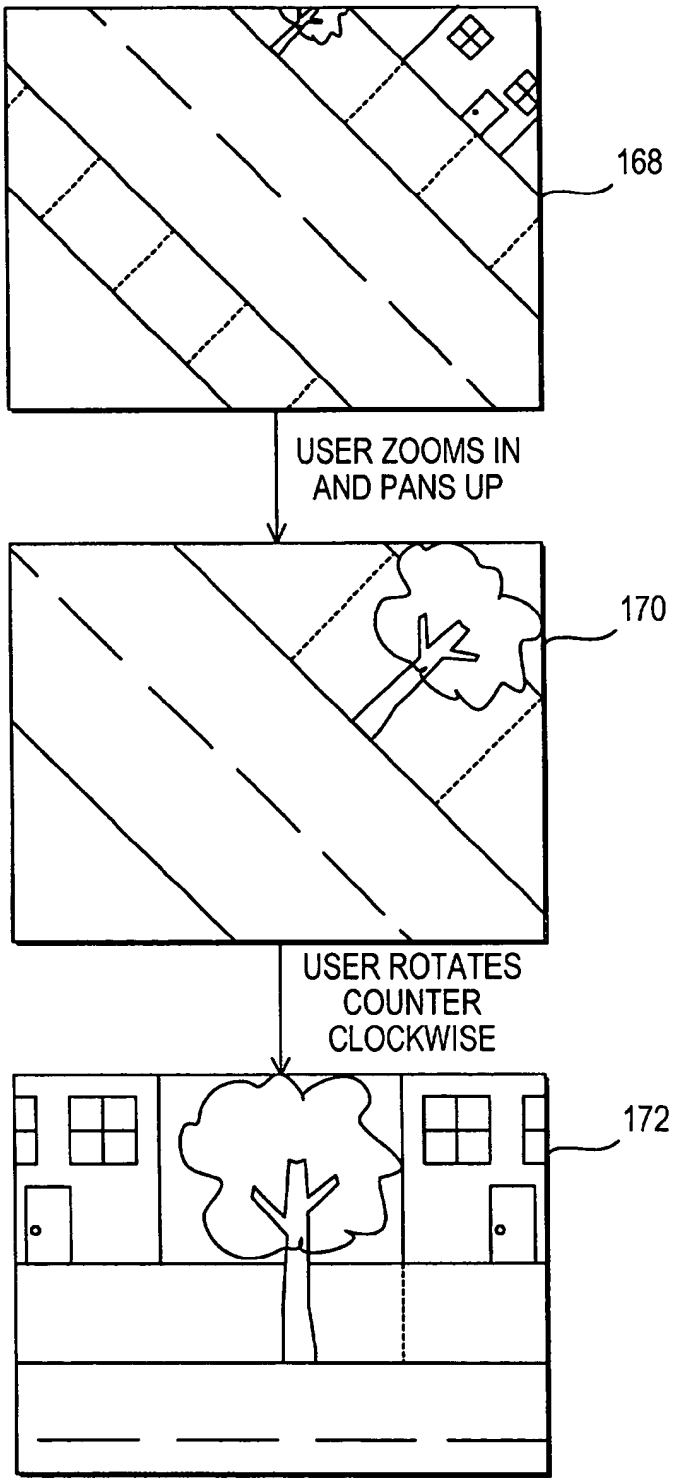

168
USER ZOOMS IN AND PANS UP
170
USER ROTATES COUNTER CLOCKWISE
172

FIG. 7

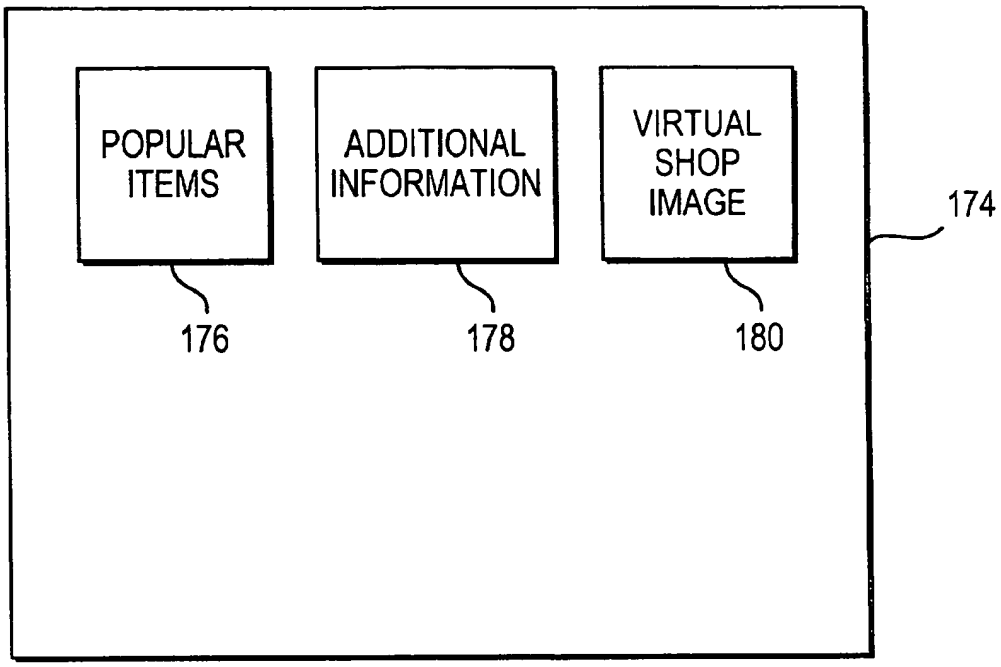

POPULAR ITEMS
ADDITIONAL INFORMATION
VIRTUAL SHOP IMAGE
174
176
178
180

FIG. 8

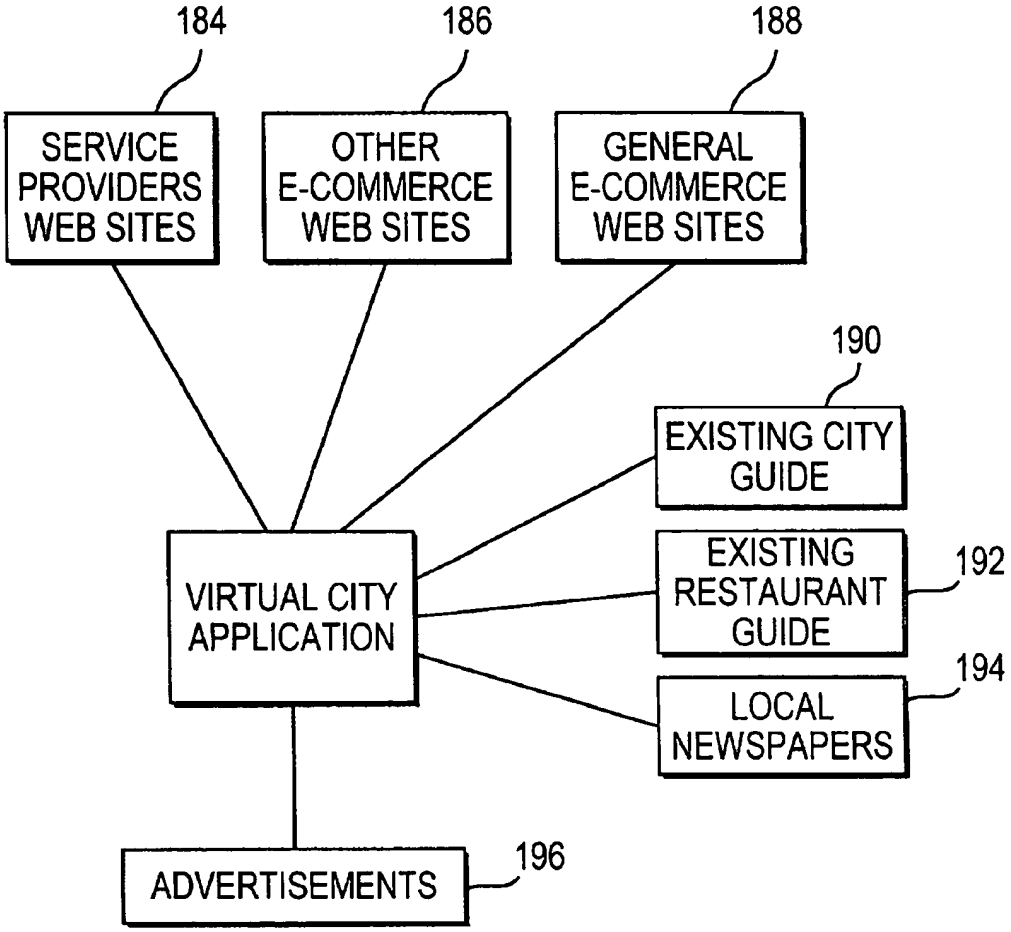

184
186
188
SERVICE PROVIDERS WEB SITES
OTHER E-COMMERCE WEB SITES
GENERAL E-COMMERCE WEB SITES
190
EXISTING CITY GUIDE
VIRTUAL CITY APPLICATION
EXISTING RESTAURANT GUIDE
192
LOCAL NEWSPAPERS
194
ADVERTISEMENTS
196

FIG. 9

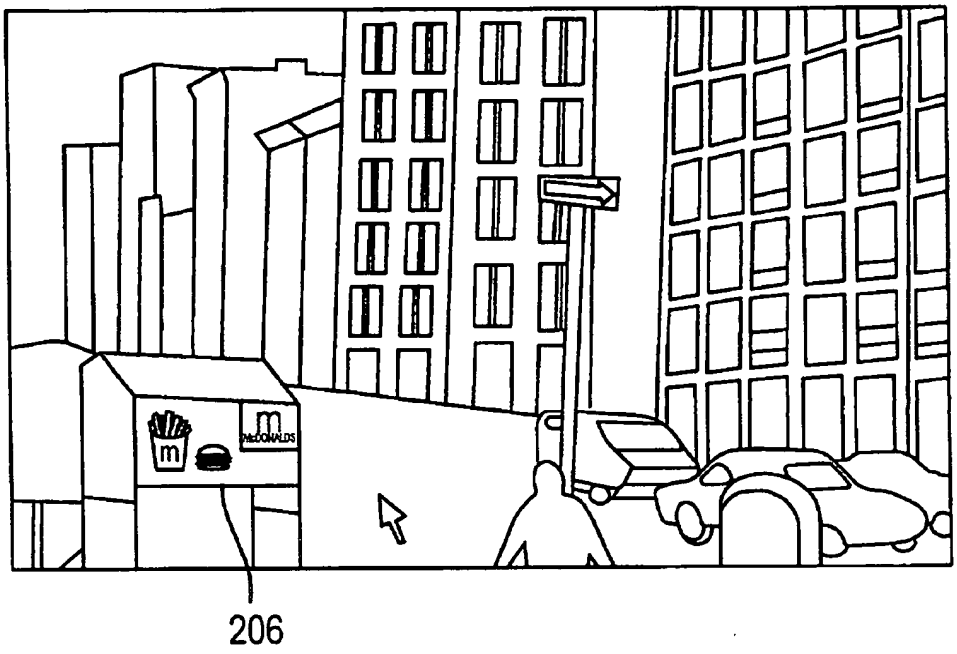


FIG. 10

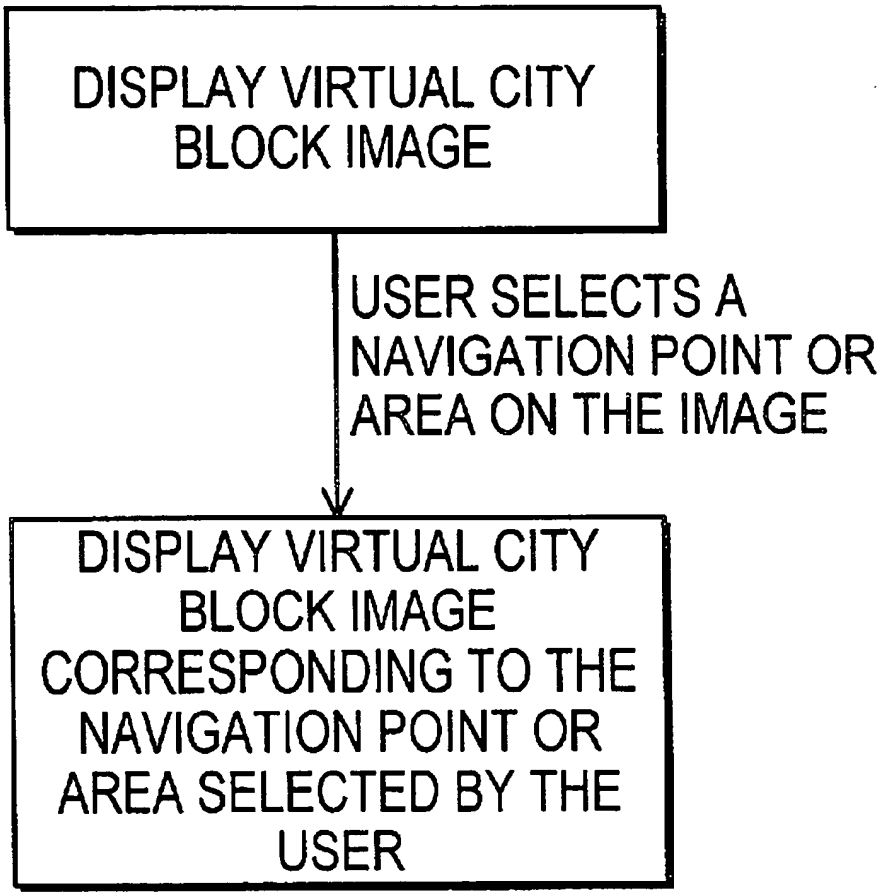

DISPLAY VIRTUAL CITY BLOCK IMAGE
USER SELECTS A NAVIGATION POINT OR AREA ON THE IMAGE
DISPLAY VIRTUAL CITY BLOCK IMAGE CORRESPONDING TO THE NAVIGATION POINT OR AREA SELECTED BY THE USER

FIG. 11

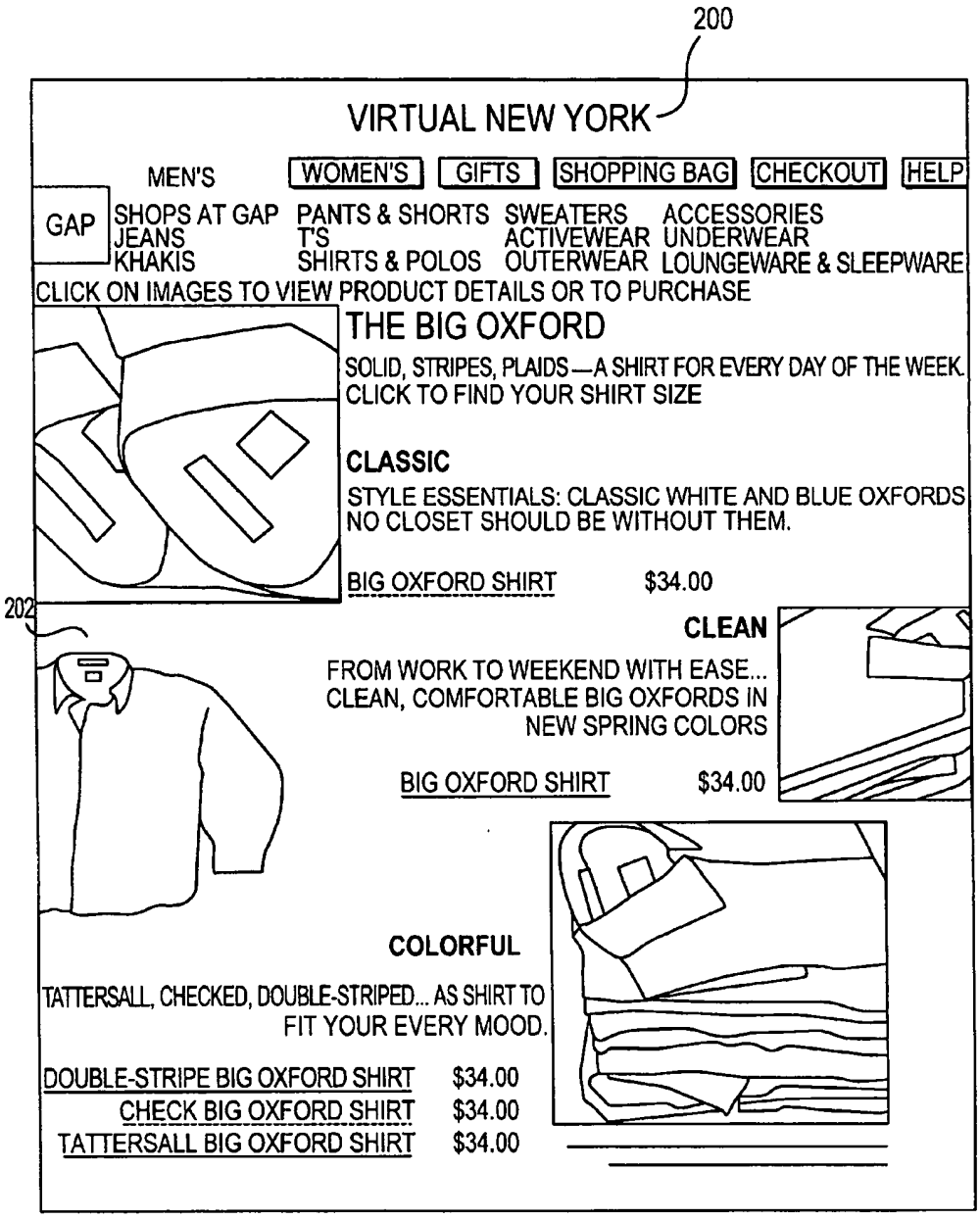

200
VIRTUAL NEW YORK
MEN'S
WOMEN'S
GIFTS
SHOPPING BAG
CHECKOUT
HELP
GAP
SHOPS AT GAP
JEANS
KHAKIS
PANTS & SHORTS
T'S
SHIRTS & POLOS
SWEATERS
ACTIVEWEAR
OUTERWEAR
ACCESSORIES
UNDERWEAR
LOUNGEWARE & SLEEPWARE
CLICK ON IMAGES TO VIEW PRODUCT DETAILS OR TO PURCHASE
THE BIG OXFORD
SOLID, STRIPES, PLAIDS—A SHIRT FOR EVERY DAY OF THE WEEK.
CLICK TO FIND YOUR SHIRT SIZE
CLASSIC
STYLE ESSENTIALS: CLASSIC WHITE AND BLUE OXFORDS
NO CLOSET SHOULD BE WITHOUT THEM.
BIG OXFORD SHIRT $34.00
202
CLEAN
FROM WORK TO WEEKEND WITH EASE...
CLEAN, COMFORTABLE BIG OXFORDS IN
NEW SPRING COLORS
BIG OXFORD SHIRT $34.00
COLORFUL
TATTERSALL, CHECKED, DOUBLE-STRIPED... AS SHIRT TO
FIT YOUR EVERY MOOD.
DOUBLE-STRIPE BIG OXFORD SHIRT $34.00
CHECK BIG OXFORD SHIRT $34.00
TATTERSALL BIG OXFORD SHIRT $34.00

FIG. 12

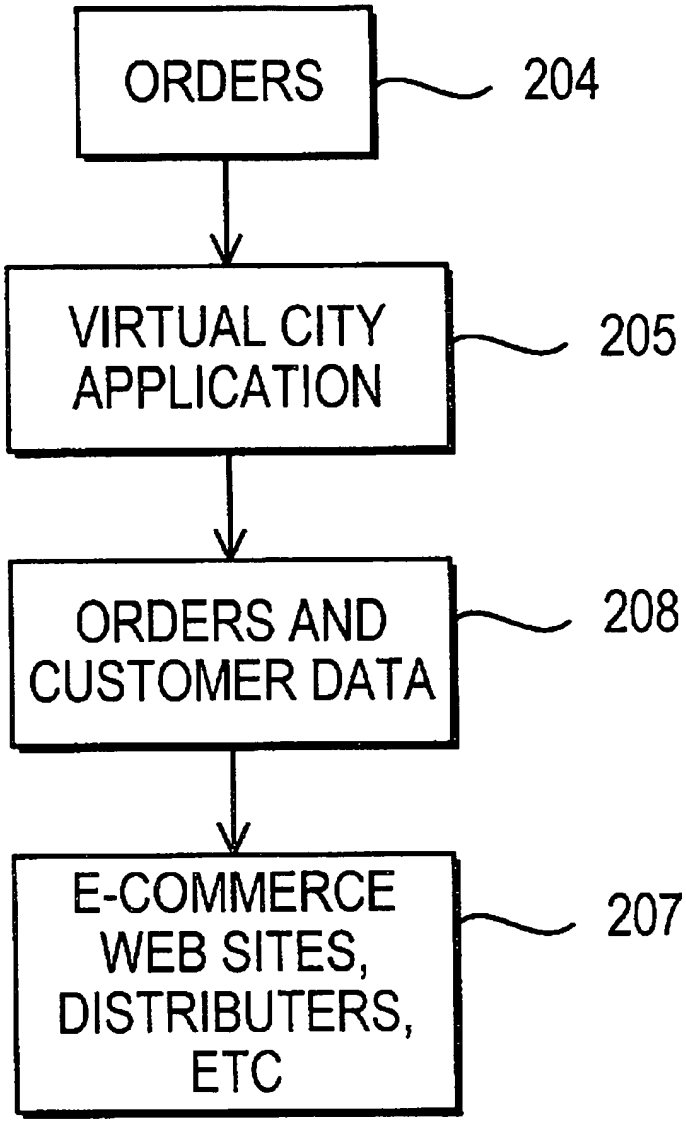

ORDERS
204
VIRTUAL CITY APPLICATION
205
ORDERS AND CUSTOMER DATA
208
E-COMMERCE WEB SITES, DISTRIBUTERS, ETC
207

FIG. 13

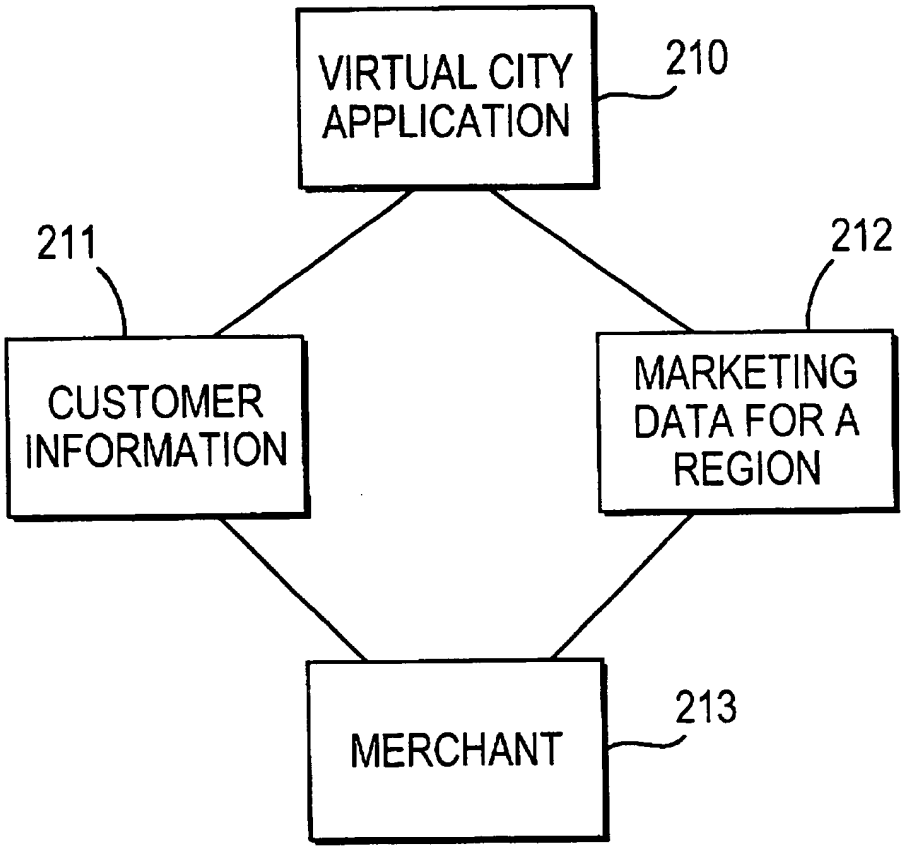

VIRTUAL CITY APPLICATION
210
211
212
CUSTOMER INFORMATION
MARKETING DATA FOR A REGION
MERCHANT
213

FIG. 14

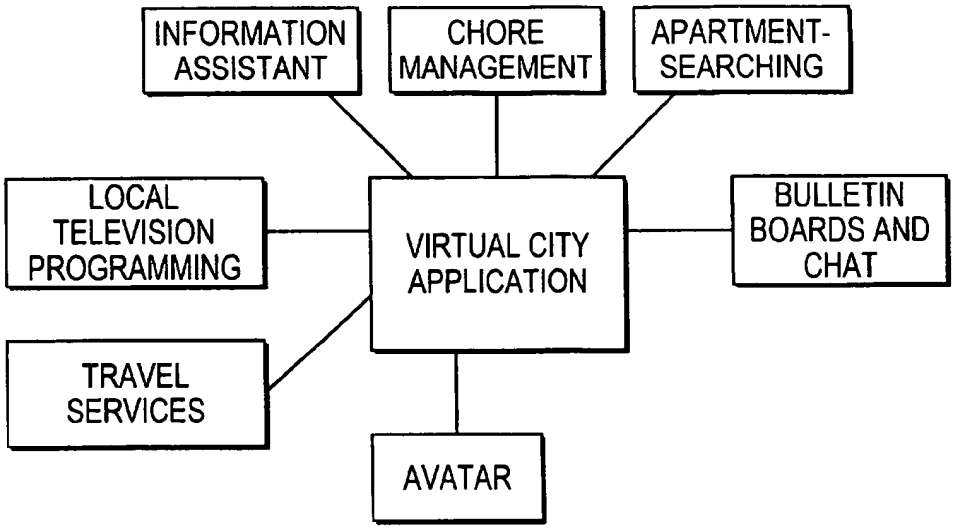

INFORMATION ASSISTANT
CHORE MANAGEMENT
APARTMENT-SEARCHING
LOCAL TELEVISION PROGRAMMING
VIRTUAL CITY APPLICATION
BULLETIN BOARDS AND CHAT
TRAVEL SERVICES
AVATAR

FIG. 15

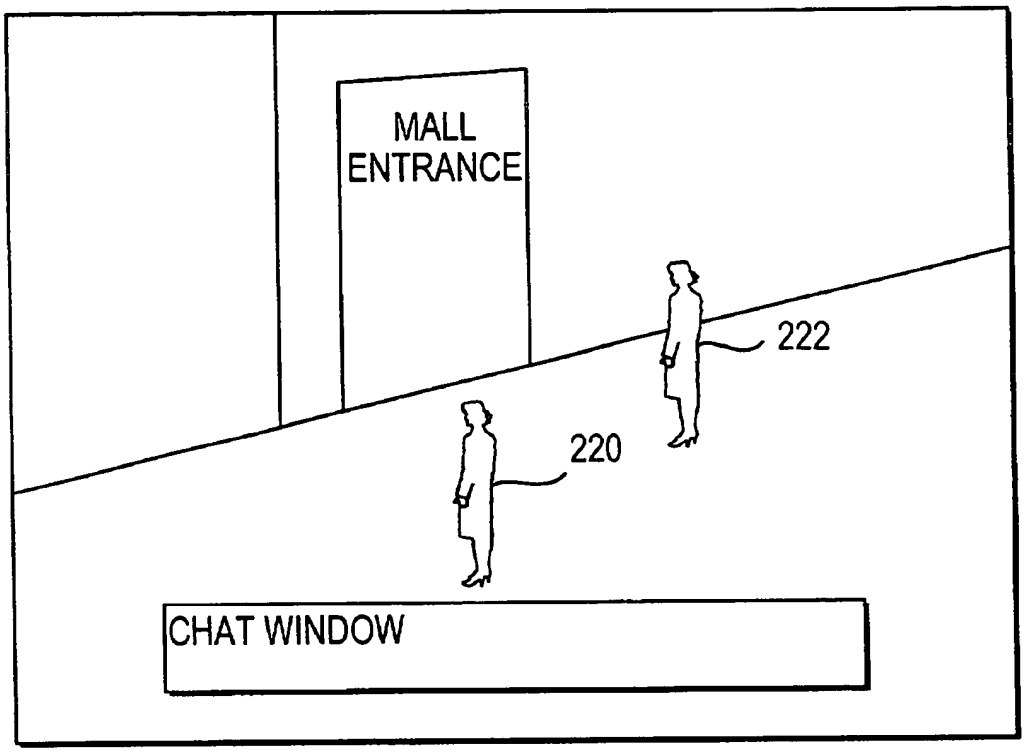


FIG. 16

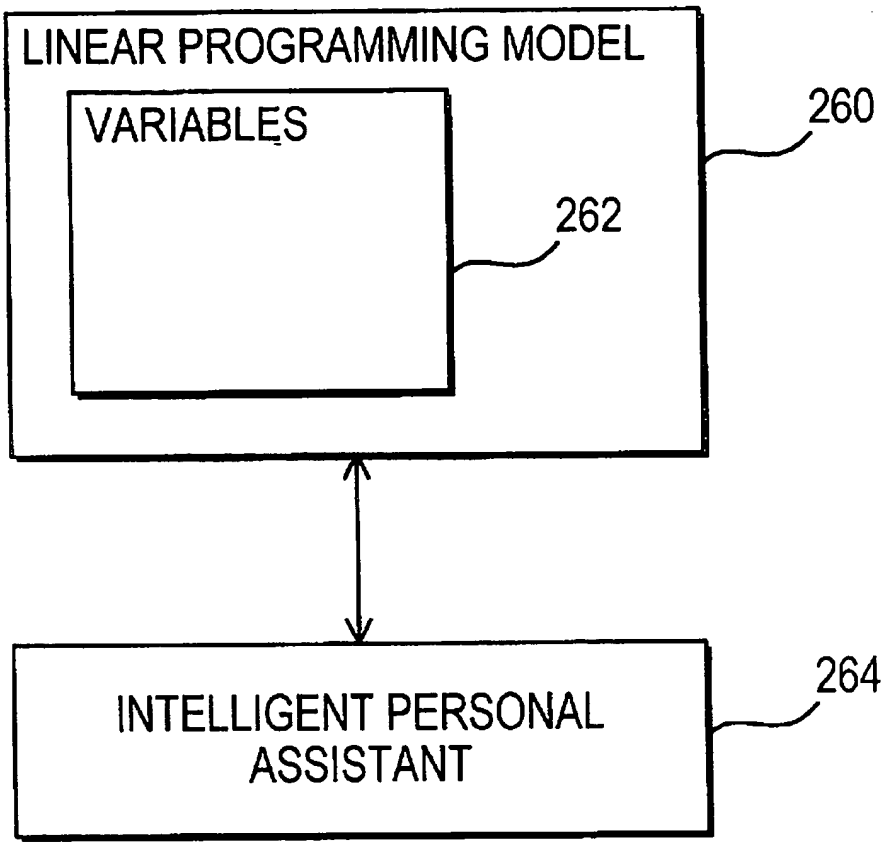

LINEAR PROGRAMMING MODEL
VARIABLES
262
260
INTELLIGENT PERSONAL ASSISTANT
264

FIG. 17

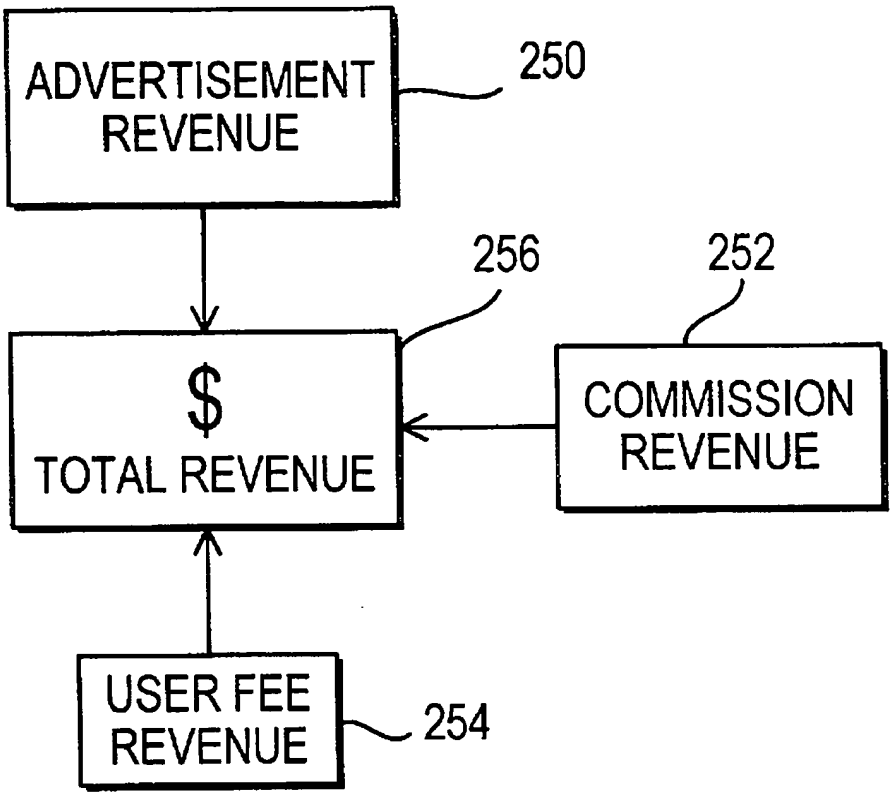

ADVERTISEMENT REVENUE
250
256
252
$
TOTAL REVENUE
COMMISSION REVENUE
USER FEE REVENUE
254

FIG. 18

METHODS AND SYSTEMS FOR PRESENTING A VIRTUAL REPRESENTATION OF A REAL CITY

[0001] This application claims the benefit of U.S. Provisional application No. 60/182,282, filed Feb. 14, 2000, which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] This invention relates to web-based virtual communities, and more particularly to an interactive, navigable, Web-based representation of a city.

[0003] Virtual communities are prevalent on the Internet. For example, web pages that provide chat rooms, message forums, and e-mail exist and offer their users the ability to interact with one another. America Online, for example, offers its subscribers access to e-commerce, chat and e-mail features, Internet access, news, and other features.

[0004] By offering users a sense of community while online, these services place the users at ease and allow them to be more comfortable while navigating around the virtual communities. However, existing virtual online communities do not give users a sense of realism. That is, although a user may be in a chat channel, perhaps directed towards conversations related to New York City, the chat channel does little to make the user feel like he or she is actually in New York City.

[0005] Existing virtual online communities also lack the ability to immerse the user in the virtual community. That is, the user is always aware that he or she is on a Web site and is interacting with data. The user interfaces of existing virtual online communities lack the sophistication that is required to immerse the user in the virtual community.

[0006] With the proliferation of the Internet, and the World Wide Web in particular, online shopping has grown in popularity. One of the major benefits of online shopping is the ability to access a wide range of products from a single web page. Because electronic merchants need only maintain stock in warehouses and do not have the additional overhead of maintaining retail stores, they are able to offer more products to online consumers. However, like virtual online communities, online shopping does not offer consumers the realism of real shopping.

[0007] Rudimentary one-stop local e-commerce World Wide Web sites, such as Kozmo.com and UrbanFetch.com, are known. For example, Kozmo.com promises to be "Amazon in under an hour." Kozmo.com warehouses books, compact discs, videos, and some other basic commodities and distributes them around select major cities via courier delivery.

[0008] Kozmo.com and UrbanFetch.com (as well as other local e-commerce sites) are fundamentally predicated upon warehouse and distribution. Because the products they sell are so commoditized, there is little need for an interactive consumer experience. The only meaningful role that the Internet plays is that of placing an order for delivery. One could just as easily call in an order. Present local e-commerce sites limit their ability to grow beyond staple items. In order to provide local e-commerce of a majority of the goods and services that one purchases in daily life, a very different approach is required.

[0009] Another web-site, HomeDelivery.com, merely provides links to local merchants. However, because individual merchants process payments, a consumer making purchases through HomeDelivery.com must register with and pay each vendor independently, effectively destroying the one-stop shopping model potential.

[0010] It is therefore an object of the present invention to provide a virtual community that provides a sense of realism and immerses users in an environment.

[0011] It is also an object of the present invention to provide substantially one-stop shopping to users without requiring the users to enter personal information multiple times.

SUMMARY OF THE INVENTION

[0012] These and other objects of the invention are accomplished in accordance with the principles of the present invention by providing a virtual city service that gives it users access to a virtual city application with a comprehensive graphic user interface. The virtual city application may provide one-stop shopping services while not burdening users with repeated requests for personal information.

[0013] The present invention is primarily described with respect to an embodiment in which a user interface may be viewed as a World Wide Web site accessible over the Internet. It should be understood that this is merely an illustrative embodiment and that any other suitable arrangement may be used.

[0014] In one suitable embodiment of the present invention, a user interface may be provided by the virtual city application of the present invention. The user interface may include a user-navigable virtual representation of an actual location, such as a city. The virtual representation may take the form of digitized images of the actual location that may be spliced together to allow navigation. For example, a user may navigate from one adjacent city block to another by selecting a horizon or any other suitable element of the display, such as icons. The images may be ordinary 2-D images, 180° images, 360° images, 3-D images, or any other suitable types of images. The images may be still images or they may be displayed as video.

[0015] Images of city blocks may include virtual storefronts. The virtual storefronts may correspond to actual stores in the real world. In another suitable approach, the storefronts may be computer-generated. Virtual storefronts may be treated as items of interest. Items of interest may generally be selectable. Upon selection, the user may be directed to a web page (in the case of a web-based implementation) that provides more information on the item of interest. For example, upon selection of a storefront, the user may be directed to a virtual representation of the interior of the store in which the user may navigate and view actual items for sale as though he or she were in a real store.

[0016] The virtual city application may also provide links (e.g., as an item of interest in an image or as an ordinary hyperlink) to web-based merchants. Whether large web-based merchants or small local merchants, the virtual city application may provide users with the convenience of one-stop shopping. For example, purchases made with merchants that are partnered with the virtual city service may be processed by the virtual city application rather than by the

individual merchants. In one suitable approach, the virtual city application may request that the user provide personal and payment information (at registration, for example). This information may subsequently be used for all purchases made through the virtual city application without having the user repeatedly provide the information to numerous merchants. The virtual city application may also provide a single virtual shopping cart, into which users may place items they wish to buy from among any of the merchants that are partnered with the virtual city service. The virtual city service may take a commission for any order that it processes.

[0017] The virtual city application may also act as a data gatherer. In one suitable approach, the virtual city application may track the patterns of use by its users. These patterns may relate to shopping, which virtual regions are visited, or to any other suitable criteria. The data may be used by merchants and by the virtual city service for marketing purposes or for any other suitable purpose.

[0018] Advertisements may be displayed as embedded advertisements within virtual city images. For example, cars, clothes, signs, banners, billboards, or any other suitable elements may all be selectable in order to provide more information about the manufacturer, product, etc. In one suitable approach, embedded advertisements may be inserted into the virtual city images using graphics processing. That is, the embedded advertisements may exist in the virtual world, but not in the real world.

[0019] The virtual city application may also provide chore management utilities. For example, plumbers, doctors, lawyers, dentists, mechanics, or any other service professionals may be searched for and contacted (e.g., for an appointment).

[0020] The virtual city application may also provide virtual travel and tourism features. For example, interest-specific virtual tours may be provided whereby users may take virtual tours based on particular preferences (e.g., jazz in New Orleans). The virtual tours may include visits to parades, museums, clubs, restaurants, or any other suitable event or location. The user may navigate among the events or locations using a process similar to that for navigating among virtual city blocks.

[0021] The virtual city application may also include an artificial intelligence component. For example, an intelligent personal assistant may be implemented that may provide automated chore-management. Decisions may be made by the intelligent personal assistant based on a linear programming model having a large number of variables. With regard to chore-management, some of these variables may include the user's location, personal preferences, habits, schedule, income, or any other suitable variables. The personal assistant is merely one example of how a linear programming model may be used with the present invention. Any other suitable implementation of a linear programming model may be made.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] **FIG. 1A** is a block diagram of an illustrative image-capturing system in accordance with an embodiment of the present invention.

[0023] **FIG. 1B** is a flow chart of illustrative steps involved in making images available to the virtual city application in accordance with an embodiment of the present invention.

[0024] **FIG. 2** is a block diagram of an illustrative virtual city image distribution system in accordance with an embodiment of the present invention.

[0025] **FIG. 3** is a block diagram of an illustrative information distribution system in accordance with an embodiment of the present invention.

[0026] **FIG. 4** shows an illustrative virtual city application display screen for navigating around a virtual city in accordance with an embodiment of the present invention.

[0027] **FIG. 5** shows the illustrative virtual city application display screen of **FIG. 4** in full mode in accordance with an embodiment of the present invention.

[0028] **FIG. 6** is a flow chart of illustrative steps involved in using a map to navigate around a virtual city in accordance with an embodiment of the present invention.

[0029] **FIG. 7** is a flow chart of illustrative virtual city application display screens for navigating around a virtual city block image in accordance with an embodiment of the present invention.

[0030] **FIG. 8** shows an illustrative virtual city application display screen for a store information page in accordance with an embodiment of the present invention.

[0031] **FIG. 9** is a block diagram of an illustrative arrangement of features that may be offered by the virtual city application in accordance with an embodiment of the present invention.

[0032] **FIG. 10** shows an illustrative virtual city application display screen for using embedded advertisements in virtual city images in accordance with an embodiment of the present invention.

[0033] **FIG. 11** is a flow chart of illustrative steps involved in navigating among virtual city blocks in accordance with an embodiment of the present invention.

[0034] **FIG. 12** shows an illustrative virtual city application display screen for seamlessly integrating the virtual city interface with other web pages in accordance with an embodiment of the present invention.

[0035] **FIG. 13** is a flow chart of illustrative steps involved in using the virtual city application to process orders in accordance with an embodiment of the present invention.

[0036] **FIG. 14** is a block diagram of an illustrative arrangement for sharing customer data and marketing information between the virtual city application and merchants in accordance with an embodiment of the present invention.

[0037] **FIG. 15** is a block diagram of an illustrative arrangement of features that may be offered by the virtual city application in accordance with an embodiment of the present invention.

[0038] **FIG. 16** shows an illustrative virtual city application display screen for using an avatar in accordance with an embodiment of the present invention.

[0039] FIG. 17 is a block diagram of an illustrative relationship between an intelligent personal assistant and a linear programming model in accordance with an embodiment of the present invention.

[0040] FIG. 18 is a block diagram of an illustrative arrangement of revenue sources provided by the virtual city application in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0041] The present invention relates to a localized navigation system that may use digital imagery and sound to recreate, in exacting detail, a virtual reality simulacrum of any desired real world city.

[0042] In the preferred embodiments of the present invention, every virtual city may be a digital replica of a real-world city in which users in that community and around the world are allowed to explore, browse, and mingle. Although it may be possible to simulate a real-world city with a virtual city using substantial precision, it may not always be desirable to do so. For example, in order to maintain an environment that is directed towards the general public, offensive material may be filtered out.

[0043] In one suitable embodiment, the present invention may be implemented as a World Wide Web site that users may access via, for example, the Internet. As it currently stands, the Internet is a "dumb" finder and sorter of information. The present invention may give the Internet the potential to provide a "smart" sensory experience.

[0044] For purposes of brevity and clarity, the present invention is described as a virtual city service made available to the public as a virtual city application via the Internet. It should be understood that this is merely an illustrative embodiment. Any other suitable hardware, software, protocols, networks, or arrangements may be used.

[0045] The present invention may provide a new type of Internet service. Both business-to-business and business-to-consumer, customers of the virtual cities service may be varied and many. Large conglomerates and family-owned businesses may both have their place in the virtual city service's online community. Individual users with interests as diverse as traveling, shopping, computer-gaming, and simplifying the business of their daily lives may come to rely on the virtual city service as their first and most-trusted venue on the web. Large vendors may make use of the virtual city service to generate incremental sales and to provide their customers far greater ease of checkout and payment—without losing control of the customer payment information. Small to medium-sized vendors may make use of the virtual cities service to make a presence on the web as part of a large, robust, dynamic community within which they will enjoy economies of scale and access to unique and valuable marketing data.

[0046] FIG. 1A shows an illustrative system that may be used for procuring images to be used by a virtual city application. The term "image," as used herein, may refer to either still images, a slide show of still images, video, a slide show of videos, animation, or any other suitable form of imagery. The basic unit of a virtual city may be city block 100. City block 100 may be any suitable fundamental portion of a city. For example, city block 100 may be an intersection, a section of a street, court, or avenue, a section of a road, an area having particular dimensions (e.g., in the shape of a square, rectangle, circle, etc.), or any other suitable fundamental portion of a city. Using any suitable image capturing device 102, such as a 180° digital camera, 360° digital camera, ordinary digital camera, film-based camera, video camera, or any other suitable image capturing device, images of city blocks may be captured.

[0047] Some or all of the captured images may be edited, stitched, or manipulated in any other suitable way using, for example, graphics editing equipment 101. Graphics editing equipment 101 may be any suitable equipment, such as personal computing equipment, super-computing equipment, silicon graphics computing equipment, any other suitable equipment, or any combination thereof. The images may be stored in image database 110, which may be located at server 103.

[0048] In one suitable embodiment of the present invention, images captured by image capturing device 102 need not be in a digitized format. For example, the images may be hard-copy photographs. At step 104 of FIG. 104, it may be determined whether the images are digitized images. If the images are not digitized, then the images may become digitized at step 106 using, for example, scanning equipment and suitable software. In the case of video, frame capture hardware and software may be used at step 106 assuming a still image embodiment of the virtual city application is being used. If virtual city blocks can be displayed using video, then video clips, streaming video, or any other suitable form of digitized video may be used.

[0049] The digitized images may then be edited and stitched together using any suitable stitching technology at step 105 and stored in database 110 at step 107. The stitching may link the images of the city blocks to one another in image database 110. Whatever links exist in the real city, such as from one city block to another, the same links may exist between the digital images of the virtual city. The result may be a network of inter-linking images that may be freely roamed, from one image to another, much like real life. This is merely an illustrative arrangement of hardware and processes. Any other suitable arrangement and processes may be used.

[0050] FIG. 2 shows an illustrative system for the present invention. Image data 112 may be loaded into data server 114 that holds image database 116. Image database 116 may be accessed by user hardware 122 using communications network 120. Communications network 120 may be the Internet, a modem connection, a wireless communications path (e.g., using wireless access protocol (WAP)), a satellite connection, a television cable connection or any other suitable peer-to-peer based or client-server based communications network. Data server 114 is shown to be coupled to communications network 120 using path 118. Path 118 may include intervening hardware, such as one or more web servers, data servers, proxy servers, gateway servers or any other suitable intervening hardware. If desired, these or any other suitable servers may be combined so that less hardware is used. For example, data server 114 may be combined with a web server. Any such suitable combination may be used if desired.

[0051] It should be understood that although only image data 112 is shown in FIG. 2, any other type of data may be

acquired and stored in a database for use by the virtual cities application. For example, audio data, text data, advertisement data, navigation data, or any other suitable data may be stored in data server **114** or in any other suitable server. Any or all types of data may be stored in a single data server. If desired, multiple data servers may be used to store data. Data servers may be separate servers dedicated to holding one or more databases, or alternatively, data servers may be combined with other types of servers, such as web servers, proxy servers, or any other suitable type of server.

[0052] User hardware **122** may be any suitable user hardware, software, or both. For example, user hardware **122** may be a personal computer with web-browsing software that may be used by users of the virtual city application to navigate among a virtual city via communications network **120**. Alternatively, user hardware **122** may be a personal computer with image-capturing hardware and suitable image-processing software that is located at a local retail site (e.g., a grocery store). In this case, user hardware **122** may provide data server **114** with updated images of the local retail site via communications network **120**. In another suitable approach, updated images of the local retail site may be made available to data server **114** using any other suitable arrangement.

[0053] **FIG. 3** shows an illustrative back-end system that may be used for the present invention. A central site **113** may be used to hold data server **114** and information database **115**. Central site **113** may be in one physical location, or, alternatively, central site **113** may include components that are located at more than one location.

[0054] Information database **115** may be stored in data server **114**, or, alternatively, information database **115** may be stored on a separate server. If desired, information database **115** may be partially stored in data server and partially stored on one or more other servers. Information database **115** may be used to store user information such as names, addresses, telephone numbers, and any other suitable user information. In one suitable approach, user information may include any suitable payment information such as credit card information, bank account information, or any other suitable payment information. In yet another suitable approach, user information may include behavioral data. Behavioral data may be acquired for each user based on the user's usage patterns in the virtual city application, such as which local merchants the user often visits using the virtual city application or any other such suitable usage patterns.

[0055] Remote sites **119** may access information database **115** using communications network **117**. Communications network **117** may be the same as communications network **120**, or communications network **117** may otherwise be any such suitable communications network. Remote sites **119** may include local merchants, web-based merchants, credit processing stations, marketing consultants, or any other suitable remote sites.

[0056] One of the features of the present invention is the interface of the virtual city application. In a real world city, any given block might contain many items of interest, such as storefronts, monuments, parks, statues, famous buildings, or any other suitable items of interest. The virtual city image of that block may contain one or more links (e.g., hyperlinks), each associated with the corresponding real world item of interest. In a web-based approach, hyperlinks may be embedded within the image of the city block. If desired, the hyperlinks may be made available to the user outside of the image of the city block, such as in a separate listing of hyperlinks associated with the currently displayed city block. This separate listing may be displayed in a separate section on the user display screen. In another suitable approach both a separate listing of hyperlinks and embedded hyperlinks may be used. When the user selects a hyperlink, additional information regarding the item of interest associated with the selected hyperlink may be displayed to the user.

[0057] **FIG. 4** shows an illustrative virtual city application display screen **124**. City block image **126** may be displayed to the user. City block image **126** may include storefronts such as storefront **128**. The user may position a cursor **130** over storefront **128** and may select storefront **130** as a hyperlink. In addition, hyperlink listings **132** may be displayed on virtual city application display screen **124**, allowing the user to select an item of interest from a textual based list rather than directly from the image. For example, listing **134** corresponds to storefront **128**. Either the embedded hyperlink or the text-based listing may be selected by the user to display additional information about that particular item of interest.

[0058] The hyperlink listing feature is particularly useful when the item of interest in not visible or is poorly visible in the city block image. For example, city block image **126** corresponds to a New York City block on which the "Vanguard Delicatessen" is found. However, the Vanguard Delicatessen storefront is not viewable in city block image **126**. The user may retrieve more information about the Vanguard Delicatessen via its corresponding hyperlink listing **136**.

[0059] If desired, hyperlink listings **132** may also include hyperlinks to items of interest that are related to items of interest found in the corresponding city block. For example, if a car dealership is a particular item of interest on a particular city block, then a possible additional hyperlink listing may be a hyperlink to a car mechanic in the immediate area. Any such suitable use of hyperlink listing **132** may be used.

[0060] A map such as map **138** may be displayed on virtual city display screen **124**. Map **138** may show the user the location of the presently displayed city block **126**. If desired, map **138** may also show neighboring attractions, such as parks, monuments, etc. Hotels, theaters, and nearby restaurants may also be displayed on map **138**. This is merely an illustrative use of maps in the virtual city application. Any other suitable arrangement may be used.

[0061] Advertisements, such as advertisement **140**, may be displayed on virtual city display screen **124**. Advertisement **140** may be a banner advertisement, or if desired, advertisement **140** may be displayed in the form of panel advertisements. Advertisement **140** may contain text, graphics, video (including animation), or a combination of these or other suitable types of content. Advertisements may be interactive. For example, advertisement **140** has interactive regions **141** and **143**. If the user selects interactive region **141** (e.g., using cursor **130**), a web page corresponding to Apartment.com may be opened and displayed. Likewise, if interactive region **143** is selected, a web page corresponding to an apartment database at Apartment.com may be opened and displayed. Advertisements need not contain multiple

interactive regions, but may simply be selectable. If desired, passive advertisements may be used. Any suitable advertisements may be used in conjunction with the virtual city application. Advertisement **140** is merely an illustration.

[0062] Updated information such as news, local events, weather, reviews, etc. may be displayed on virtual city application display screen **124**. For example, city events and information **148** may be displayed. Local news **146** may be displayed. Local weather **144** may be displayed. The updated information may correspond to the city in which the presently displayed city block is. If desired, updated information regarding the neighborhood in which the presently displayed city block is may be displayed. If desired, updated information regarding the block itself may be displayed. The information displayed on virtual city application display screen **124** may include snippets of information that may be made available to the user upon request. For example, local news **146** may include short headlines to make the user aware of the top local news stories. For additional, more in-depth coverage of the local news, the user may select a hyperlink associated with local news **146** (e.g., a particular headline may be selected, or local news title **147** may be selected, etc.). Once selected, a new web page may be displayed having additional information. This is an illustrative arrangement of displaying local information on a virtual city application display screen. Any other type of suitable arrangement may be used.

[0063] In one suitable embodiment, the virtual city application may offer the user an opportunity to search for items of interest. For example, one or more keywords may be entered by the user in search box **142**. The search may be limited to searches by category (as illustrated), or the searches may be limited to other parameters. In another suitable approach, no limitations need be placed on searches.

[0064] Various items on the virtual city application display screen may be shown in more than one mode. For example, city block image **126** may be shown in either full screen mode or in regular screen-size mode. The default mode may be the regular mode. Screen **124** shows city block image **126** in regular mode. A full option **150** may be provided that may allow the user to enlarge city block image **126** so that it fills the entire browser window or the computer screen. In full mode, every other item of functionality may become a button at the top or bottom of the display screen (or browser window, if the browser window is not maximized). This is illustrated in **FIG. 5**. City block image **158** is the full mode version of city block image **126** (**FIG. 4**). Buttons **160** may correspond to the various items of functionality displayed in screen **124** of **FIG. 4**. For example, map button **162** in screen **156** may correspond to map image **138** in screen **124**. To retrieve the image of the map, the user may select map button **162**. This may cause a full mode map image to appear. In one suitable approach, selecting map button **162** may cause the display screen to be changed to regular mode, thus displaying the map image in regular mode. If desired, selecting map button **162** may cause a new web page to be displayed that includes a map image. The new web page may be displayed in place of the currently displayed web page in the current browser window, or the new web page may be displayed in a new browser window overlaying the current browser window.

[0065] In one suitable embodiment, resolution options **149** and **151** may be provided to the user. Because the connection speed of different users may stretch across a large range, the user may be given the opportunity to choose a resolution level of the virtual city block images that best corresponds to the connection speed being used by the user. The resolution level may include the level of image quality, image size, colors used, or any other suitable components.

[0066] Density options **145** and **147** may be provided to the user. The user may be given the opportunity to choose a density level of items of interest and virtual city blocks to be displayed. The density level may correspond to whether certain virtual city blocks should be displayed based on the number of items of interest that are present on the blocks. For example, if the user is using a slow modem connection, then he or she would not wish to download images of virtual city blocks that are empty alleys. By setting the density to a lower level, these virtual city blocks may be skipped as the user navigates through the virtual city.

[0067] Density options **145** and **147** and resolution options **149** and **151** are merely illustrative. If desired, more choices of resolution levels and density levels may be provided (e.g., a quantitative resolution level may be used). If desired, the resolution level and density level may be automatically assigned by the virtual city application that may take into account the user's connection speed and personal preferences. The user may still, however, retain the ability to alter these automatic settings.

[0068] One of the navigation utilities that the virtual city application may provide to the user is the ability to select a point or a region in map **138** to view the corresponding virtual city block image for the selected point or region. This process is illustrated in **FIG. 6**. At step **164** a map is displayed on the virtual city application display screen. The user may choose a point or region on the map, using, for example, a cursor controlled by a mouse. In response, at step **166**, the virtual city application may display a virtual city block image that may correspond to the point or region selected by the user.

[0069] The full mode option may also be provided for map **138** to provide greater detail. This is helpful, for example, in order to view the map in block-by-block detail. Furthermore, this feature may provide greater ease of navigation. Whereas selecting an area on the regular mode map may direct the user to the general area selected on the map, clicking on the full mode map may direct the user to the exact block the user desires. This is merely an illustrative use of the map feature of the present invention. Any other suitable use may be implemented for the map feature.

[0070] Audio option **152** may also be provided. Audio option **152** may allow the user to listen to location-specific ambient sound. Each virtual city block may be associated with a code (e.g., stored in a relational database) that corresponds to an audio track. These audio tracks may include sounds typically heard on highways, busy streets, residential streets, intersections, parks, etc. The user may activate the audio feature by selecting audio option **152**. Likewise, the user may be given the ability to deactivate the audio feature by selecting an appropriate item on the virtual city application display screen. Any such suitable use of an audio feature may be used. If desired, other, more interactive sounds may be provided (e.g., a microphone may be installed on all or particular city blocks, and the user may be given the opportunity to listen to the sounds in real-time).

Alternatively, the sounds of a particular block may be recorded as audio clips available to the user at a later time.

[0071] Virtual city block image **126** (as well as the counterpart full mode virtual city block image **158**) need not be static. The virtual city application may provide the user with the ability to navigate within the virtual city block image. For example, the user may be given the ability to use a mouse (or the cursor keys on a keyboard) to move within the virtual city block image. This feature is particularly useful when the virtual city block image is a 180° image or a 360° image because the user may be given the ability to navigate the city block to a higher degree using the virtual city block image. The navigation may be accomplished by clicking on the virtual city block image and holding down either the left or right mouse button. This may alter the perspective and create the appearance of movement. Navigation functionality may include pan left, pan right, pan up, pan down, zoom in, zoom out, rotate, any combination thereof, or any other suitable function. **FIG. 7** illustrates the use of some of these navigation functions. Virtual city block image **168** may be a 360° image of a particular real city block. If the user zooms in and pans up, virtual city block image **170** may be displayed. If the user then issues a command associated with counterclockwise rotation, virtual city block image **172** may be displayed. The navigation may take place in a smooth and continuous manner, giving the user the impression of actual movement. That is, the user may feel that he or she is actually moving his or her head to get a different view of the city block.

[0072] In one suitable embodiment, selecting a storefront such as storefront **128** may link the user to a web page containing a detailed image of that establishment, with information on its location, phone number(s), nearest subway stop, and the goods sold there. If desired, any other suitable information may be provided. An illustrative information web page **174** is shown in **FIG. 8**. A list **176** of the most popular items or categories of items sold at the selected store may be displayed to the user. Any other suitable number of most popular items may be displayed. If desired, other criteria may be used for displaying items. For example, items may be displayed based on the merchant's choice based on, for example, current sale items. Any such suitable criteria may be used to determine which items to display. This feature may allow the user to have an accurate sense of whether the shop carries the particular item for which he or she is looking. Other information **178** about the store may be provided, such as its history or a brief biography of the proprietors. In one suitable approach, the navigable virtual image feature as hereinbefore described for virtual city block images may be used for the interiors of stores and other establishments selected by the user. Virtual shop image **180** may therefore be displayed on web page **174**. The user may be given the ability to navigate around the virtual store image (e.g., using panning, zooming, and rotating features) using, for example, either regular mode or full mode. In one suitable approach, users may navigate around a virtual store using any suitable features, including, but not limited to, those shown in **FIGS. 4 and 5**. The preceding is merely an illustrative embodiment of a store information web page. Any other suitable design, arrangement, information, and features may be used.

[0073] Every storefront in every virtual city block image may be selectable by the user. In another suitable approach, some storefronts may merely be passive images. Upon selection of a storefront, a web page such as web page **174** may be displayed to provide further information about the selected storefront. In another suitable approach, any other suitable web page may be displayed in response to a selection of a storefront.

[0074] This is merely an illustrative use of information web pages. Similar detail may be made available for any or all items of interest—not just storefronts. Every park and monument, every restaurant and theater, every church and community center, may have corresponding information on its history, hours of operation, show-times, reviews, and goods and services provided, or any other suitable information made available via the virtual city application.

[0075] In one suitable embodiment of the virtual city service of the present invention, information web pages such as web page **174** may be provided to merchants (i.e., merchants of the storefronts in the virtual city blocks) without cost. This will allow for a greater number of stores to be represented in the virtual city.

[0076] In another suitable approach, web-based e-commerce merchants may have a presence in the virtual city community as well. For example, virtual storefronts may be created in place of, for example, empty lots. These virtual storefronts may be used by, for example, e-commerce merchants that do not have any physical establishments in the real city. In another approach, real stores may change their locations or add new locations by creating virtual storefronts in any suitable location in the virtual city.

[0077] In one suitable embodiment of the present invention, the virtual city application may be used to display advertisements to users. **FIG. 9** shows advertisements **196** being used in the virtual city application. Advertisements **196** may include banners, icons, text, video, images, embedded advertisements, and any other form of advertisements. Embedded advertisements are advertisements that are part of the virtual city block images. For example, **FIG. 10** shows a typical view of a virtual city block image. Sign **206** is an advertisement for McDonald's. The virtual city application may allow the user to select sign **206** as an embedded advertisement. Upon selection, the user may be directed to a web page giving more information about the advertised product or service. This feature may be applied to billboards, posters, signs, murals, clothing, automobiles, and essentially anything visible in the virtual city image.

[0078] If an advertiser, retailer, manufacturer, or merchant does not wish to have real advertisements and items that are visible in the virtual city block image to be embedded advertisements, those items may be made to be passive. Alternatively, those items may be substituted with other items for which another advertiser, retailer, manufacturer, or merchant does want an embedded advertisement. This may be done using any suitable computer graphics software to edit the virtual city block image.

[0079] In one suitable approach, embedded advertisements may be used by local merchants to the extent that real world advertisements can not. For example, a local grocery store may advertise itself using, for example, an embedded advertisement such as a billboard that may be added to a virtual city block image using any suitable graphics processing hardware, software, or both. This billboard may be

viewed by residents of the neighborhood, visitors of the neighborhood, or by any other users of the virtual city application by navigating to the virtual city block. In this respect, smaller, local merchants may reach the large audiences a billboard is intended to reach, but without going through the process (e.g., acquiring permits, payment of large fees, etc.) of physically placing a billboard up. This is merely an illustrative approach to local advertising. Any other suitable approaches may be used.

[0080] In one embodiment of the present invention, the virtual city application may allow users to navigate around the virtual city by providing selectable horizons. That is, the user may select the end of the currently displayed city block represented by the virtual city block image (e.g., the end of the street). This may cause a virtual city block image corresponding to the block adjacent to the currently displayed virtual city block to be displayed. The direction may be determined by the area the user selected. For example, if the user selects the end of the block, the next block after the point selected may be displayed. If the user selects the other end of the block, then the block adjacent to that end may be displayed. Likewise, if the user selects a side of the displayed block, the block adjacent to the selected side may be displayed. This method of navigation is illustrated in **FIG. 11**.

[0081] In addition to user interface features, the virtual city application of the present invention may offer its users many types of on-line resources using the interactive nature of its interface. Some of these resources, as illustrated by **FIG. 9**, may include, but are not limited to, links to general e-commerce web sites **188** (e.g., Amazon.com, Buy.com, etc.), links to other local e-commerce sites **186** (e.g., UrbanFetch.com., Kozmo.com, etc.), links to service providers **184** (e.g., on-line banking, etc.), links to existing on-line city guides **190** (e.g., sidewalk.com, etc.), links to existing on-line restaurant guides **192** (e.g., Zagats.com, etc.), links to existing on-line local newspapers **194** (e.g., nypost.com, etc.), links to existing on-line national newspapers (e.g., msnbc.com, etc.), as well as links to any other suitable on-line resources. Agreements between the provider or providers of the virtual city application and the providers of the on-line resources being linked from within the virtual city application may be made.

[0082] If desired, certain modifications may be made to the on-line resource web page so that the user may be directed to the on-line resource web page from the virtual city application seamlessly. For example, these modifications may include having the color scheme of the on-line resource match the color scheme of the virtual city application interface. If desired, these modifications may include displaying the on-line resource web page in a frame within the virtual city application interface. If desired, an interface such as that illustrated in **FIG. 12** may be used, whereby the on-line resource web page may be displayed in combination with virtual city application content without the use of frames. This method of seamless integration of content provides a co-domain environment in one web page. Heading **200** may be displayed and may correspond to the provider of the virtual city application. Heading **200** may be selectable. If the user selects header **200**, the user may be redirected to the virtual city web page.

[0083] While navigating in an e-commerce web site, or any other type of web site, the user may always return to the main virtual city application web site. For example, after making a purchase using the virtual city application to process the order, the user may be returned to the virtual city application web site. Even if the user does not purchase anything, the user may always be given the ability to return to the virtual city application web site. For example, in **FIG. 12**, the user may simply click on heading **200** (which may be displayed on every web page of the web site, no matter how deeply into that web site the user travels) and be returned to the virtual city application web site. Any other suitable method, interface design, or both may be used for always giving the user the ability to return to the virtual city application web site.

[0084] In the case of e-commerce web sites, such as the one shown in **FIG. 12**, if the user desires to make a purchase, and selects the appropriate icon, link, banner, button, etc., the user may process his or her purchase order through the virtual city application and the virtual city service. For example, if the user wishes to purchase an item from Gap.com, the user may progress through the Gap.com web page (that may have been seamlessly integrated with the virtual city application and the user may view the content normally displayed on Gap.com, including product descriptions, item descriptions and images, etc. When the user wishes to make a purchase, however, the order may be processed through the virtual city application rather than through Gap.com's own servers. Payment may be made to the virtual city service rather than to Gap.com. This process is illustrated in **FIG. 13**, which show customer orders **204** being processed by virtual city application **205**, that in turn sends orders and stored customer data **208** to appropriate merchants **207** for fulfillment. Orders **204** may include any suitable information about customer orders, such as item descriptions, item identification numbers or codes, quantity information, color and size information, or any other suitable customer order information. Order and customer data **208** may include the customer order information of order **204** as well as any suitable customer data that is stored by the virtual cities application.

[0085] By linking all order processes from all e-commerce web sites accessible through the virtual city application, the user is given the ability to shop for items at multiple places, each purchase being made through a single source. This allows the user to register only once. The subjection of the user to queries for personal and payment information is therefore minimized using the virtual city application. Instead of having to register and provide payment information at every web site at which the user wishes to make a purchase, the user may simply have all purchases made through the virtual city service using the virtual city application. In one suitable approach, the user may also be given the ability to go from web site to web site, adding items to a virtual shopping cart. After all desired items are in the virtual shopping cart, the user may process the order using the virtual city application.

[0086] The one-stop method of e-commerce shopping as described is merely illustrative. Any other suitable method may be used. For example, the virtual city application need not process any orders. If desired, the virtual city application may only process orders for certain merchants, perhaps based on whether the merchant desires to take advantage of the feature.

[0087] **FIG. 13** also shows customer data being transferred from the virtual city application to the e-commerce site. Customer data may include information such as information that the user entered when the user registered for the virtual city service. This may include such information as name, addresses, telephone numbers, e-mail addresses, survey answers, as well as any other suitable information. The e-merchant may be provided with the information without the user having to enter the information again. The information may be used for any suitable purpose. For example, the information may be used for marketing purposes, for building a customer database, for delivery information, or for any other suitable purpose.

[0088] The virtual city application may also provide merchants (including large e-commerce merchants as well as local shops) with marketing data for particular regions. The virtual city application may compile marketing data based on the sales it processes. In an alternative approach, marketing data may be based on any other suitable interactions between users and the virtual city application. This data may be provided to merchants in order to, for example, better serve the merchants' marketing efforts in terms of, for example, advertising. **FIG. 14** shows merchants receiving individual customer information as well as general marketing data for one or more regions of a city. Virtual city application **210** may provide customer information **211** and marketing data **212** to merchant **213**. The precision of the marketing data is high given the fact that the virtual city application is collecting a vast amount of data by acting as the middleman in e-commerce transactions that spread across a wide spectrum of merchants.

[0089] The virtual city application may be made to be as robust as desired. **FIG. 15** illustrates some other features that the virtual city application may offers its users. These features may include chore management services, apartment searching services, bulletin board messaging and chat services, an avatar feature, travel services, local television programming, and an intelligent information assistant. The next several paragraphs will describe these features in more detail. It should be understood that any such suitable features may be implemented and that these features, herein described, are merely illustrative.

[0090] Chore management services may allow the user to access services (i.e., as compared to products) using the virtual city application. These services may include, but are certainly not limited to, allowing the user to pay bills online, schedule appointments (e.g., for doctors, lawyers, job interviews, plumbers, etc.), make restaurant reservations, do on-line banking, balance a checkbook, as well as any other suitable services, including giving the user the ability to find and try new service providers. As with product purchases, service purchases may be made using the virtual city application as the payment processor in accordance with the present invention.

[0091] The virtual city application may also provide apartment searching services. For example, real estate brokers and agents may have listings of available apartments (and houses) available through the virtual city application. The user may select these listing to be given a virtual tour of the apartment. The virtual tour may be given in a manner similar to allowing the user to navigate among virtual city blocks as described hereinbefore. That is, the user may be given the ability to navigate around the apartments using, for example, 360° images of the apartment. The user may be given the ability to open doors, look in closets, look out the window, and hear the sounds in the apartment (e.g., to find out how noisy it is). If desired, a virtual real estate agent may speak as the user tours the apartment. The pre-recorded speech may correspond to what the user is currently viewing. The user may be given the ability to navigate around the neighborhood by simply using the virtual cities application to view the virtual city blocks as hereinbefore described. This is merely an illustrative description of the apartment searching feature. It should be understood that any other suitable method of using the present invention for apartment searching may be used. For example, private owners may be given the ability to place links in a classifieds section of the virtual city application advertising their apartment for rent. It should also be understood that this feature may be expanded to include apartment sales, house sales, land sales, commercial building leasing and sales, etc.

[0092] Because the virtual city application is intended to represent a real community, bulletin board messaging and chat functionality may be added. Users may post messages or chat about certain topics or may post messages and chat to each other based on where in the virtual city they currently are. For example, users viewing the virtual South Street Seaport in Manhattan may be given the ability to chat to other users currently viewing the South Street Seaport as well.

[0093] Avatars may also be provided by the virtual city application. Avatars may be graphical representations of online identities. That is, an image of a person or any other suitable entity may represent a real person navigating around virtual city. These images may be actual images of the users using the virtual city application, they may be arbitrary images, or they may be any images chosen by the users. Avatars may allow people from distant places to meet at a particular place in the virtual city environment and, for example, go shopping at the mall. Interviews may be conducted in this fashion. Meetings may be held in a virtual conference between attendees that are hundreds or thousands of miles apart. **FIG. 16** illustrates how avatars may be displayed to the user using the virtual city application. Avatar **220** may represent one of the users, while avatar **222** may represent another user. The two users represented by the avatars may interact with one another using chat functions or messaging functions. In one suitable approach, the users may use microphones to transmit their voices to one another. The preceding description is merely an illustrative use of avatars. Any other suitable use may be implemented.

[0094] Another feature that may be implemented in the virtual city application is the ability to display local television programming. In particular, television programming for a particular region may be made available to the user currently in the virtual representation of that region. For example, as the user is navigating around his or her virtual hometown, the user may view a local broadcast of a local baseball game.

[0095] The virtual city application may also give the user travel-related options—in both the real sense as well as the virtual sense. For example, the user may be given the ability to make airline and hotel reservations. The virtual city application may also have a tour feature, whereby the user may take a virtual tour of a particular destination. For example, if the user wishes to visit New York, the virtual city application may take the user on a guided tour of New York's tourist attractions. The user may be taken to virtual representations of real museums, monuments, neighborhoods, shows, and whatever else the user may wish to see.

If desired, a tour guide may accompany the tour via, for example, the avatar feature and the audio capabilities of the present invention, or alternatively via text messages that may accompany the images.

[0096] Tours may be based on place, interest, age, or any combination of these or any other suitable factors. For example, the user may wish to see a tour of the jazz scene in New Orleans. The virtual city application may be made to oblige this request and give the user a tour of the jazz clubs, and jazz museums and exhibitions in accordance with the present invention. This is merely an illustrative tour feature. Any such suitable tour feature may be used.

[0097] In one embodiment of the present invention, artificial intelligence may be used by the virtual city application to aid users in making full use of the features being offered. In its simplest form, artificial intelligence may take the form of a search engine. As was shown by search box **142** of **FIG. 4**, users may simply enter keywords and have the virtual city application search for relevant items of interests in the virtual city images or for other types of suitable content.

[0098] In another suitable approach, a back-end artificial intelligence component of the virtual city application may use a linear programming model to provide users with an intelligent personal assistant. **FIG. 17** shows an illustrative linear programming model **260** upon which intelligent personal assistant **264** may be predicated. A large number of variables **262** may be used to make the decision-making of linear programming model **260** more precise. Intelligent personal assistant **264** may be used to, for example, automatically perform personal chores over the Internet. More particularly, the chore management functionality of the present invention may be made programmable and automatable.

[0099] By taking into account a user's preferences, habits, dislikes, location, schedule, and any other suitable criteria, the personal assistant feature of the virtual city application may perform many of the user's daily tasks without the need for user interaction. For example, searching for a service provider, such as a dentist may be based on the location criterion of the Upper West Side of Manhattan, the specialization criterion of cosmetic dentistry, and the price criterion of moderately expensive. Any other suitable criteria may be used in having the intelligent personal assistant search for a suitable dentist. In another suitable embodiment, intelligent personal assistant **264** may be given the capability to recommend restaurants based on preferences, pay the user's bills, manage finances, comparison shop for staple items, arrange convenient delivery times (e.g., depending on whether the user lives in a doorman building, when the user is home, etc.) and perform any other suitable services. Any such suitable capability may be given to intelligent personal assistant **264**.

[0100] In one suitable embodiment of the present invention, the interface of the virtual city application with which the user interacts may be implemented using any suitable hardware, software, or both to create a three-dimensional world. For example, virtual reality markup language (VRML) may be used to create three-dimensional web pages. Any other suitable tools for creating three-dimensional graphics may be used.

[0101] Three-dimensional representations of a city may be coupled with the use of a walkthrough interface. For example, as a user navigates around virtual city blocks, the movement appears as a smooth continuous movement. This type of movement is contrasted with the static walkthrough where, as previously described, the user may need to click on horizons or other suitable links to navigate to adjacent locations. Any such suitable type of movement may be used. If desired, the user may be given the option of which movement to use, based on, for example, connection speed, personal likes/dislikes, or based on any other suitable factors.

[0102] In one suitable embodiment, the user may be given the ability to use public transportation (or any other suitable form of transportation). For example, the user may take a virtual subway from one location in a virtual city to another location. This may be displayed to the user using a virtual representation of a subway and a virtual representation of a subway car. The user may virtually board the appropriate subway car required to travel to the desired location. This is merely an illustrative use of virtual transportation and the present invention is in no way limited to virtual subways. For example, there may be virtual taxis, virtual buses, virtual horses and carriages (e.g., to take through a virtual Central Park), virtual airplanes (e.g., to go from one virtual city to another), virtual cruises, or any other suitable form of virtual transportation.

[0103] Whether using two-dimensional imaging or three-dimensional imaging, the amount of data that is communicated from data server **114** to user hardware **122** (**FIG. 2**) is potentially huge. In order to make the use of the virtual city application more efficient for those users whose connection speed is relatively slow, some data that is commonly communicated from data server **114** to user hardware **122** may be made available to users on portable media, such as CD-ROM disks, DVD-ROM disk, minidisks, high-capacity floppy disks, or any other suitable type of portable media. The portable media may be sent to the user using, for example, the U.S. Postal Service or any other suitable mail carrier. The content of the portable media may include the most commonly accessed images of a particular region.

[0104] In another suitable approach, there may be many different categories of data available on portable media. For example, one such category may relate to art museums. In such a case, the portable media may contain all of the virtual museum images of some of the most popular art museums in the world. The portable media may be required to be used in conjunction with the virtual city application. This is merely an illustrative example of the use of portable media. Any other suitable application for portable media may be used.

[0105] In terms of revenue, the present invention may use any suitable revenue sources. **FIG. 18** illustrates some of the possible sources of revenue of the virtual city service. For example, in one suitable approach, total revenue **256** may include advertisement revenue **250**. For example, fees may be charged for embedded advertisement based on, for example, the amount of traffic for the particular virtual block on which the advertisement is to appear. In another suitable approach, fees may be based on the type of embedded advertisement that is to be used. For example, billboard advertisements may demand a higher fee than a small sign.

[0106] Total revenue **256** may also include commission revenue **252**. As was previously described, the virtual city application may process the payments for orders placed by users with merchants that are partnered with the virtual city service. In exchange, the virtual city service may take a fixed fee or a percentage of sale for services rendered in processing the payments.

[0107] Total revenue **256** may also include user fee revenue **254**. The virtual city service may charge users access fees. Access fees may vary depending, for example, on the level of service desired. For example, a bronze membership may provide users with fewer features than a gold membership. The price for bronze membership may therefore be lower than the price for gold membership. In another suitable approach, users may be charged on a pay-per-view basis. For example, if the user wishes to take a tour of a particular California vineyard, the user may be charged a fee to access that tour. Any such suitable features may be available on a pay-per-view basis.

[0108] The preceding is merely illustrative of sources of revenue for the virtual city service. Any other such possible sources of revenue may be used to acquire revenue.

[0109] Thus, methods and systems for presenting a virtual representation of a real city are provided. One skilled in the art will appreciate that the present invention can be practiced by other than the described embodiments, which are presented for purposes of illustration and not of limitation, and the present invention is limited only by the claims which follow.

What is claimed is:

1. A method for centralizing localized e-commerce using a virtual city application that provides to users an interface, comprising:

creating virtual representations of stores in the interface in which local merchants are allowed to sell goods and services;

providing the users access to the virtual representations of stores, wherein the users are allowed to place items that are for sale in the virtual representations of stores into a single virtual shopping cart; and

processing payment for the items in the virtual shopping cart using the virtual city application.

2. The method defined in claim 1, further comprising creating virtual representations of stores in the interface in which web-based merchants are allowed to sell goods and services.

3. The method defined in claim 1, wherein creating virtual representations of stores comprises digitizing images of storefronts and images of stores' interiors.

4. The method defined in claim 1, wherein processing payment comprises:

accessing payment information for the users from a database;

receiving funds from the users in payment for the items in the virtual shopping cart based on the payment information; and

placing an order for the items with the respective local merchants.

5. The method defined in claim 4, further comprising:

acquiring revenue by retaining a commission from the funds received; and

paying the respective local merchants the funds received less the commission retained.

6. The method defined in claim 1, wherein providing users access comprises:

allowing the users to access the virtual city application via a communications network;

displaying the virtual city application interface to the users; and

enabling the users to navigate among virtual city block images viewable via the virtual city application interface.

7. The method defined in claim 1, further comprising creating the virtual representations of stores for the respective local merchants.

8. The method defined in claim 1, further comprising acquiring revenue by charging the users a fee for use of the virtual city application.

9. The method defined in claim 1, further comprising acquiring customer information from the users prior to the processing of payment, wherein the acquisition of the customer information occurs only once, and wherein the customer information is used for subsequent purchases made using the virtual city application.

10. The method defined in claim 9 wherein the customer information comprises payment information.

11. A system for centralizing localized e-commerce using a virtual city application that provides to users an interface, comprising:

means for creating virtual representations of stores in the interface in which local merchants are allowed to sell goods and services;

means for providing the users access to the virtual representations of stores, wherein the users are allowed to place items that are for sale in the virtual representations of stores into a single virtual shopping cart; and

means for processing payment for the items in the virtual shopping cart using the virtual city application.

12. The system defined in claim 11, further comprising means for creating virtual representations of stores in the interface in which web-based merchants are allowed to sell goods and services.

13. The system defined in claim 11, wherein means for creating virtual representations of stores comprises means for digitizing images of storefronts and images of stores' interiors.

14. The system defined in claim 11, wherein means for processing payment comprises:

means for accessing payment information for the users from a database;

means for receiving funds from the users in payment for the items in the virtual shopping cart based on the payment information; and

means for placing an order for the items with the respective local merchants.

15. The system defined in claim 14, further comprising:

means for acquiring revenue by retaining a commission from the funds received; and

means for paying the respective local merchants the funds received less the commission retained.

16. The system defined in claim 11, wherein means for providing users access comprises:

means for allowing the users to access the virtual city application via a communications network;

means for displaying the virtual city application interface to the users; and

means for enabling the users to navigate among virtual city block images viewable via the virtual city application interface.

17. The system defined in claim 11, further comprising means for creating the virtual representations of stores for the respective local merchants.

18. The system defined in claim 11, further comprising means for acquiring revenue by charging the users a fee for use of the virtual city application.

19. The system defined in claim 11, further comprising means for acquiring customer information from the users prior to the processing of payment, wherein the acquisition of the customer information occurs only once, and wherein the customer information is used for subsequent purchases made using the virtual city application.

20. The system defined in claim 9 wherein the customer information comprises payment information.

21. A system for centralizing localized e-commerce using a virtual city application that provides to users an interface, comprising:

a central site at which virtual representations of stores are created for use in the interface in which local merchants are allowed to sell goods and services;

a data server configured to provide the users access to the virtual representations of stores, wherein the users are allowed to place items that are for sale in the virtual representations of stores into a single virtual shopping cart; and

hardware at the central site configured to process payment for the items in the virtual shopping cart using the virtual city application.

22. The system defined in claim 21, further comprising hardware at the central site configured to create virtual representations of stores in the interface in which web-based merchants are allowed to sell goods and services.

23. The system defined in claim 21, further comprising hardware at the central site configured to digitize images of storefronts and images of stores' interiors.

24. The system defined in claim 21, further comprising:

an information database that stores payment information for the users;

a communications network that is used to transfer funds for payment for the items in the virtual shopping cart using the payment information; and

hardware at the central site configured to place an order for the items with the respective local merchants.

25. The system defined in claim 21, further comprising:

a communications network configured to allow the users to access the virtual city application;

graphics processing and display hardware configured to display the virtual city application interface to the users; and

user control hardware configured to enable the users to navigate among virtual city block images viewable via the virtual city application interface.

26. The system defined in claim 21, further comprising hardware at the central site configured to create the virtual representations of stores for the respective local merchants.

27. The system defined in claim 21, further comprising hardware at the central site configured to acquire customer information from the users prior to the processing of payment, wherein the acquisition of the customer information occurs only once, and wherein the customer information is used for subsequent purchases made using the virtual city application.

28. The system defined in claim 27, wherein the customer information comprises payment information.

29. A method for providing a user an interactive virtual representation of a city via a communications network, comprising:

storing images of substantially most city blocks making up the city in a database;

linking the images to one another in substantially the same way the corresponding city blocks are linked; and

allowing the user to navigate among the city blocks.

30. The method defined in claim 29, further comprising inserting embedded advertisements within the images.

31. The method defined in claim 29, further comprising:

allowing the user to select areas of the images; and

performing an action upon the user selecting one of the areas.

32. The method defined in claim 31, wherein performing an action comprises displaying additional information.

33. The method defined in claim 29, further comprising:

displaying storefronts in the images;

allowing the user to select at least one of the storefronts; and

displaying a virtual representation of the inside of a store corresponding to a selected storefront.

34. The method defined in claim 29, wherein allowing the user to navigate comprises:

allowing the user to select a particular direction of a first city block; and

displaying a second city block that is linked to the first city block.

35. The method defined in claim 29, further comprising:

displaying an image of a map having selectable areas;

allowing the user to select the selectable areas; and

displaying a city block that corresponds to an area selected from the map.

36. A system for providing a user an interactive virtual representation of a city via a communications network, comprising:

a database in which images of substantially most city blocks making up the city are stored;

hardware configured to link the images to one another in substantially the same way the corresponding city blocks are linked; and

hardware configured to allow the user to navigate among the city blocks.

37. The system defined in claim 36, further comprising graphics editing equipment that is used to insert embedded advertisements within the images.

38. The system defined in claim 36, further comprising hardware configured to:

allow the user to select areas of the images; and

perform an action upon the user selecting one of the areas.

39. The system defined in claim 38, wherein the hardware is further configured to display additional information.

40. The system defined in claim 36, further comprising hardware configured to:

display storefronts in the images;

allow the user to select at least one of the storefronts; and

display a virtual representation of the inside of a store corresponding to a selected storefront.

41. The system defined in claim 36, further comprising hardware configured to:

allow the user to select a particular direction of a first city block; and

display a second city block that is linked to the first city block.

42. The system defined in claim 36, further comprising hardware configured to:

display an image of a map having selectable areas;

allow the user to select the selectable areas; and

display a city block that corresponds to an area selected from the map.

43. A method for using a linear programming model to provide automated services based on a plurality of variables, comprising:

using the linear programming model to process a user's preferences, schedule, and requests; and

performing actions based on the linear programming model over a communications network.

44. The method defined in claim 43, wherein the performing actions is selected from a group consisting of making appointments, placing orders for items, placing orders for services, scheduling deliveries, and any combination thereof.

* * * * *

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(12) **United States Patent**
Aho et al.

(10) **Patent No.: US 6,256,043 B1**
(45) **Date of Patent: Jul. 3, 2001**

(54) **THREE DIMENSIONAL VIRTUAL REALITY ENHANCEMENT TECHNIQUES**

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(73) Assignee: **Lucent Technologies Inc.**, Murray Hill, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/938,304**

(22) Filed: **Sep. 26, 1997**

(51) **Int. Cl.**[7] **G06T 11/00**
(52) **U.S. Cl.** **345/433**; 345/428; 345/474; 345/972
(58) **Field of Search** 345/419, 433, 345/428, 474, 972

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(74) *Attorney, Agent, or Firm*—Eugene J. Rosenthal

(57) **ABSTRACT**

For a world that has a portion of the world distant from the point of view of the user represented in only two dimensions as a video on a video screen, when an object on the video screen undergoes a trajectory that takes at least a portion of it to a location in the world that is not represented by the video but instead is a location in the world that is represented by computer graphics, in addition to being able to continue to see such an object when it is rendered as computer graphics in the computer graphics part of the world, i.e., popped out from the video, one is able to interact with such an object. Thus, an object which pops out from a video into the computer graphics part of the world may be "investigated" by a viewer of the world. For example, the user could enter a store which popped out of the video, and engage in virtual shopping therein. The particular store which is actually entered may be customized on a per user basis, e.g., as a function of geography. When the proprietor of a virtual store, or his representative, e.g., electronic agent, detects the avatar of one or more persons in the vicinity of the avatar of a store for which such proprietor's store corresponds to the virtual store for such passing persons, a message may be transmitted to such passing persons.

44 Claims, 4 Drawing Sheets

(2 of 4 Drawing Sheet(s) Filed in Color)

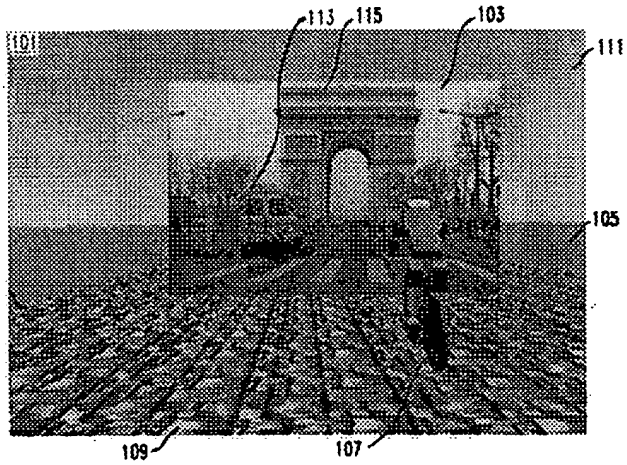


FIG. 1

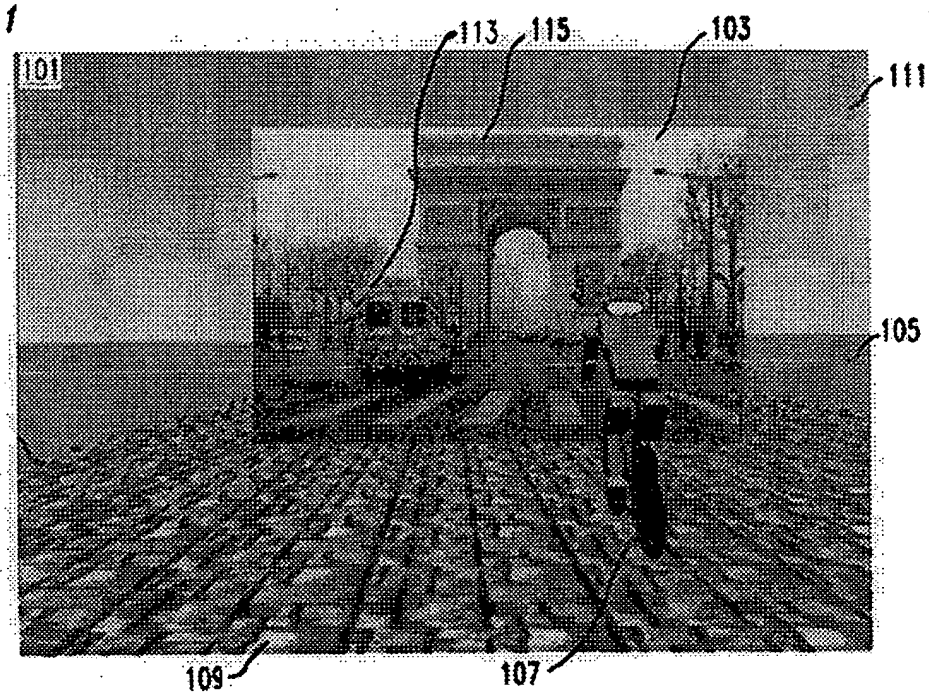


FIG. 2

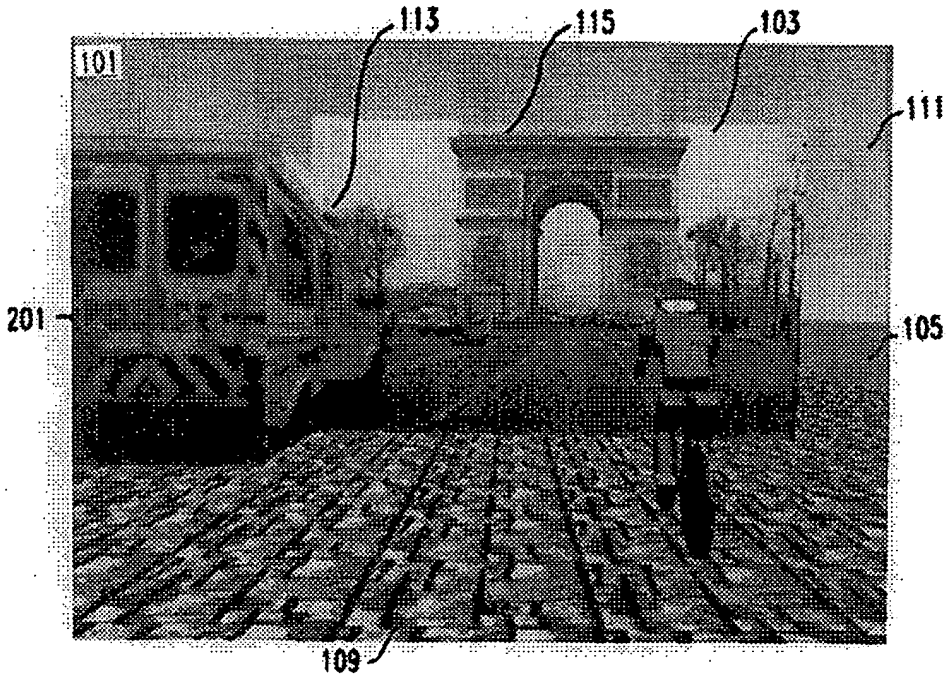


FIG. 3

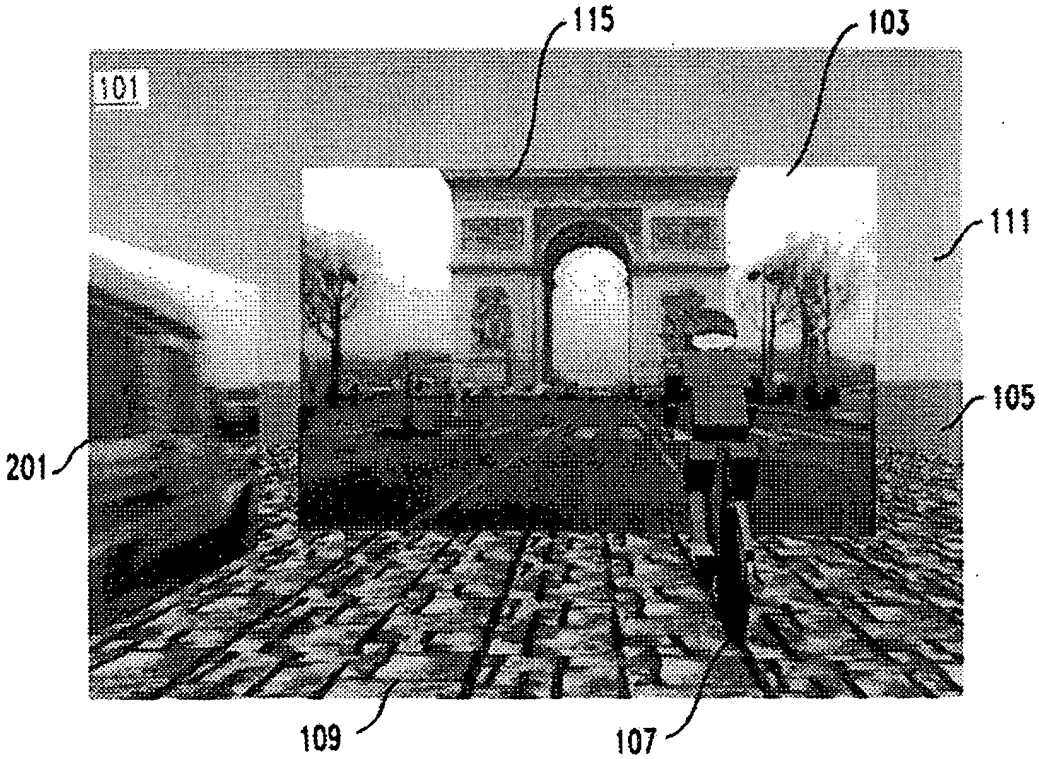


FIG. 4

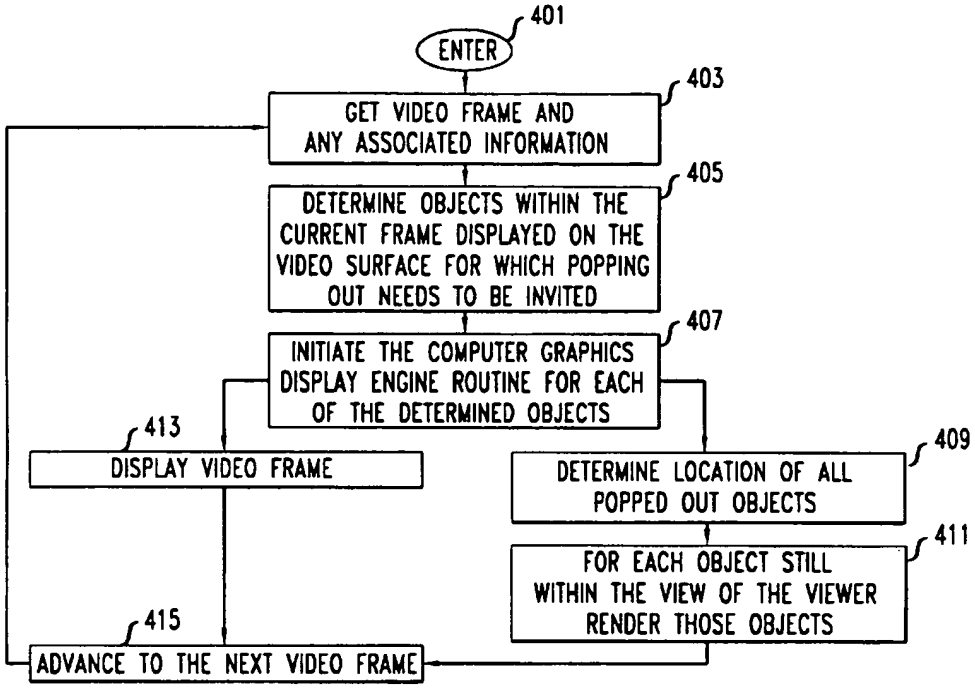

401
ENTER
403
GET VIDEO FRAME AND ANY ASSOCIATED INFORMATION
405
DETERMINE OBJECTS WITHIN THE CURRENT FRAME DISPLAYED ON THE VIDEO SURFACE FOR WHICH POPPING OUT NEEDS TO BE INVITED
407
INITIATE THE COMPUTER GRAPHICS DISPLAY ENGINE ROUTINE FOR EACH OF THE DETERMINED OBJECTS
413
DISPLAY VIDEO FRAME
409
DETERMINE LOCATION OF ALL POPPED OUT OBJECTS
411
FOR EACH OBJECT STILL WITHIN THE VIEW OF THE VIEWER RENDER THOSE OBJECTS
415
ADVANCE TO THE NEXT VIDEO FRAME

FIG. 5

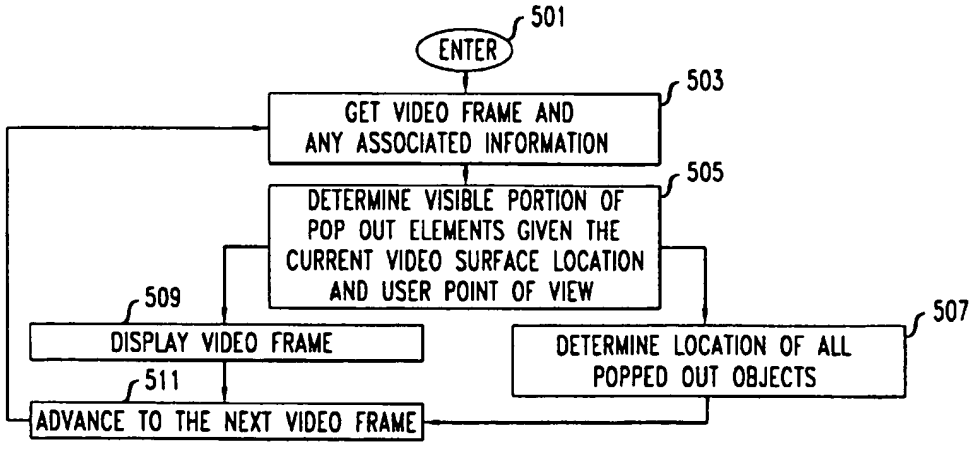
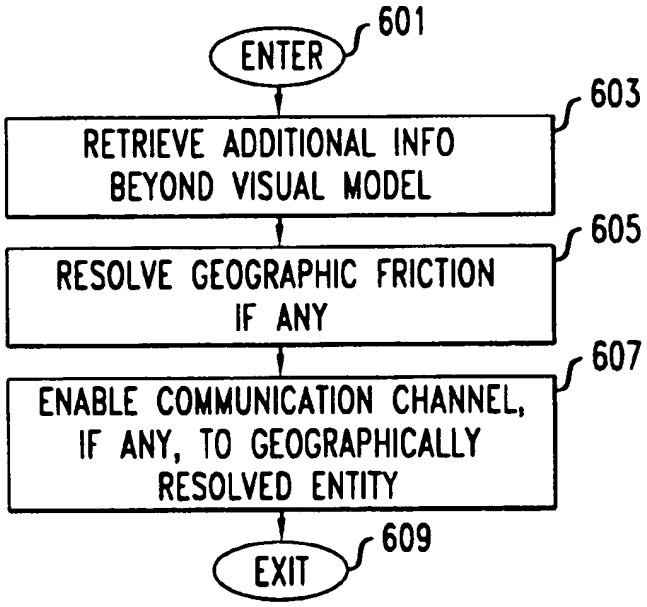

501
ENTER
503
GET VIDEO FRAME AND ANY ASSOCIATED INFORMATION
505
DETERMINE VISIBLE PORTION OF POP OUT ELEMENTS GIVEN THE CURRENT VIDEO SURFACE LOCATION AND USER POINT OF VIEW
509
DISPLAY VIDEO FRAME
507
DETERMINE LOCATION OF ALL POPPED OUT OBJECTS
511
ADVANCE TO THE NEXT VIDEO FRAME

FIG. 6


601
ENTER
603
RETRIEVE ADDITIONAL INFO BEYOND VISUAL MODEL
605
RESOLVE GEOGRAPHIC FRICTION IF ANY
607
ENABLE COMMUNICATION CHANNEL, IF ANY, TO GEOGRAPHICALLY RESOLVED ENTITY
609
EXIT

THREE DIMENSIONAL VIRTUAL REALITY ENHANCEMENT TECHNIQUES

TECHNICAL FIELD

This invention relates to the integration of computer graphics and video to provide a realistic three dimensional virtual reality experience.

BACKGROUND OF THE INVENTION

The display of a three dimensional world to a viewer requires considerable computation power, and it is typically costly to develop the necessary highly detailed models required for doing so. In order to simplify the problem, a portion of the world that is in the distance may be represented in only two dimensions as a video displayed on a surface, e.g., a screen. By video it is meant the common usage of the term, such as the placing or projecting of predefined images on the surface, e.g., the electronic version of filmed moving pictures. Thus, such a world is essentially truncated in length to the screen on which the video is displayed. A great reduction in computation power and cost can be achieved by such an arrangement.

In U.S. patent application Ser. No. (case Carraro-Ensor 2-7) it was recognized that a limitation of such a world occurs when an object within the field represented by the video undergoes a trajectory that takes it to a location in the world that is not represented by the video but instead is a location in the foreground which is represented by computer graphics, namely, any portion of the object that is no longer on the video screen, disappears. Therefore, when an object within the field represented by the video undergoes a trajectory that takes it, or a portion thereof, to a location in the world that is not represented by the video but instead is a location in the foreground which is represented by computer graphics, such an object or portion is made to continue to be visible to the user and is represented at the foreground location using computer graphic techniques, rather than video. Thus, the video object "pops" out of the video and becomes visible, e.g., in front of, or to the side of, the video screen, rather than becoming invisible because it is no longer on the video screen.

SUMMARY OF THE INVENTION

We have recognized that, for a world that has a portion of the world distant from the point of view of the user represented in only two dimensions as a video on a video screen, when an object on the video screen undergoes a trajectory that takes at least a portion of it to a location in the world that is not represented by the video but instead is a location in the world that is represented by computer graphics, in addition to being able to continue to see such an object when it is popped out from the video into the computer graphics part of the world, it is advantageous for one to be able to interact with such an object. Therefore, in accordance with the principles of the invention, an object which pops out from a video into the computer graphics part of the world may be "investigated" by a viewer of the world. One way that this may be achieved is by receiving an indication of a selection of such an object by a user and, in response thereto, providing the user with additional information about the selected object. Another way that this may be achieved is by receiving an indication of a selection of such an object by a user and, in response thereto, allowing the user to explore within the selected object.

For example, if the user is bicycling down the Champs Elysees in Paris, France, as one approaches La Place de l'Etoile in the center of which is the Arc de Triomphe, built by Napoleon Bonaparte, and the Arc de Triomphe as it is passed by the bicyclist pops out of the video, the user could click on the popped-out Arc de Triomphe which is now in the computer graphics part of the world and obtain historical information about it, e.g., displayed in a window on the screen. Alternatively, if the user is represented in the world as an avatar riding on a bicycle, the user avatar, in response to appropriate commands, such as mouse clicks, could be made to dismount the bicycle and further investigate the Arc de Triomphe, e.g., entering therein, ascending a set of stairs and looking out from one or more viewpoints. The user could then return to his bicycle and continue his journey in the world which has a portion of the world distant from the point of view of the user represented in only two dimensions as a video on the video screen and the remainder of the world as computer graphics.

As another example, the user could enter a store which popped out of the video, and engage in virtual shopping therein. In accordance with an aspect of the invention, the particular store which is actually entered may be customized on a per user basis. Thus, for different users who are traversing the same course and seeing the same representations, e.g., an avatar, of a store or vendor cart that popped out from the video, who the particular vendor is that will serve the user and provide him with the virtual shopping service may be different for different users. In accordance with an aspect of the invention, the particular vendor may be selected as a function of the actual geographic location of the user, or a particular location that is associated with the user. If two or more users are simultaneously exploring the same world together, e.g., two friends bicycling together, in accordance with an aspect of the invention, each user, or different subsets of the users, may be served by a different vendor, e.g., as a function of specified parameter, such as their individual geographic locations. Alternatively, even if there is more than one user, and such users would otherwise be served by different vendors, e.g., as a function of their respective locations, in accordance with an aspect of the invention, such users could specify that a subset, or all of them, should be served by a single vendor.

In accordance with another aspect of the invention, when the proprietor of a virtual store, or his representative, e.g., electronic agent, detects the avatar of one or more persons in the vicinity of, e.g., passing, the avatar of a store for which such proprietor's store corresponds to the virtual store for such passing persons, a message, such as an advertisement, or other communication, such as opening a communication channel, e.g., a chat service or voice communication channel, may be transmitted to, or initiated with, such passing persons. The communication may be general in nature or it may be customized as a function of information available regarding the passing persons. Advantageously, a feeling of community may be engendered in the virtual environment

BRIEF DESCRIPTION OF THE DRAWING

The file of this patent contains at least one drawing executed in color. Copies of this patent with color drawing (s) will be provided by the Patent and Trademark Office upon request and payment of the necessary fee.

In the drawing:

FIGS. 1–3 show an example of a video object "popping" out of a video and so becoming visible in front of, or to the side of, the video screen;

FIG. 4 shows an exemplary process by which objects within the field represented by the video surface that, due to

their projected motion are to be in the three dimensional world, are so displayed using computer graphics techniques, e.g., the object "pops out" of the video surface;

FIG. **5** shows another exemplary process by which objects within the field represented by the video surface that, due to their projected motion are to be in the three dimensional world, are so displayed using computer graphics techniques; and

FIG. **6** shows steps of a process by which aspects of the invention may be implemented.

DETAILED DESCRIPTION

Before describing how an object which pops out from a video into the computer graphics part of the world may be "investigated" by a viewer of the world, in accordance with the principles of the invention, an example of a video object "popping" out of the video and becoming visible in front of, to the side of, above, or below the video screen, rather than simply becoming invisible because it is no longer on the video screen, is shown in FIGS. **1–3**. For simplification of terminology purposes, a portion of an object may simply be referred to as an object, since any portion of an object may be considered an object in its own right.

FIG. **1** shows world **101**, which is the Champs Elysees in Paris, France, as one approaches La Place de l'Etoile in the center of which is the Arc de Triomphe, built by Napoleon Bonaparte. World **101** is divided into two portions, video screen **103**, on which is shown the current frame of a video and the remainder of the world **105**, which is represented using computer graphics techniques, and is thus referred to herein as computer graphics part (CG Part) **105**. The current frame of video being displayed on video screen **103** includes police van **113** and Arc de Triumph **115**. Within CG Part **105** there are various elements, such as bicyclist **107**, representing the user, road **109**, and sky **111**.

Note that the viewpoint of the user is actually behind the representation of the user in the form of bicyclist **107**. Also note that police van **113**, which is part of the current video frame being shown on video screen **103**, is moving slower than bicyclist **107**, so that police van **113** will eventually be passed by bicyclist **107** as he continues to ride toward Arc de Triumph **115**.

FIG. **2** shows world **101** of FIG. **1**, but at a later time. At the time of FIG. **2**, the frame of video being shown on screen **103** is from a view closer to Arc de Triumph **115**. Such a frame may have resulted, for example, from moving the camera that captured the video closer to Arc de Triumph **115**. As a result of the camera location when the frame of video on screen **103** that is shown in FIG. **2** was taken, only a portion of police van **113** was captured video frame. The rest of the police van **113** was out of view of the camera, and hence is not visible within the current frame of video on screen **103** that is shown in FIG. **2**. However, from the viewpoint of the user, looking at world **101** as it appears in FIG. **2**, the remaining portion of police van **113** should be visible, notwithstanding that it is no longer within the boundaries of video screen **103**. Therefore, the remaining portion of police van **113** is displayed using computer graphic techniques within world **101** as element **201**, which is apart of CG Part **105**.

FIG. **3** shows world **101** of FIG. **1**, but at a time even later than that of FIG. **2**. Thus, at the time of FIG. **3**, the frame of video being shown on screen **103** is from a view still closer to Arc de Triumph **115** than that of FIG. **2**. As a result of the camera location when the frame of video on screen **103** that is shown in FIG. **3** was taken, none of police van **113** is visible within the current frame of video on screen **103** that is shown in FIG. **3**. However, from the viewpoint of the user, looking at world **101** as it appears in FIG. **3**, police van **113** should be visible to the user's left, notwithstanding that it is no longer within the boundaries of video screen **103**. Therefore, the entirety of police van **113** is displayed using computer graphic techniques within world **101** as element **201**, which is a part of CG Part **105**. At least a portion of element **201** will continue to be displayed as part of CG Part **105** until element **201** passes completely from the user's viewpoint.

FIG. **4** shows an exemplary process by which objects within the field represented by the video surface that, due to their projected motion are to be displayed in the three dimensional world, e.g., in front of, to the side of, above, or below, the video surface, are so displayed using computer graphics techniques, so that the object "pops out" of the video surface. In typical embodiments of the invention, the objects to be displayed using computer graphics are predefined, and their location in the video and the time associated with its position within the video is known, so that the time and extent at which the object needs to be popped out of the video is known. However, the techniques of the invention may be employed with computers and software which are sufficiently sophisticated to track recognizable objects within the video surface and to develop computer graphics models from such video representations in order to create the popped out computer graphics.

The process is entered in step **401** when the user selects a video to view and the first frame of the video is to be displayed to a user. In step **403**, the video frame to be displayed is retrieved. This may be achieved by retrieving data representing the frame which is pointed to by a pointer. Such a frame pointer is set initially, e.g., in step **401**, to point to the first frame of the video. Next, in step **405**, it is determined if there are any objects with the current video frame which is to be displayed on the video screen for which popping out needs to be initiated. This may be achieved by employing additional information associated with the frame that describes any objects that need to be popped out. Such additional information may also include data necessary to render the object as well as motion data which indicates the path of the object. Alternatively, this step may be achieved by analyzing the content of the video frame, perhaps in conjunction with prior frames and future frames, to determine data necessary to render the object as well as motion data which indicates the path of the object. In addition, the viewpoint given to the user by the overall display may be incorporated in the determination. Such a viewpoint is determined by camera controls, which may be set by the user. Of course, a combination of the foregoing techniques may also be employed. In step **407**, a computer graphics display engine routine is initiated for each of the objects determined in step **405**. Each of these computer graphics routines are supplied with the information necessary to generate their respective objects as time passes with each frame for display on the video surface. For example, the information supplied for each object may include the aforementioned motion data which indicates the path of the object.

Next, steps **409** and **411** are performed substantially in parallel with step **413**. The degree of parallelism to be achieved should enable the popped out objects to be displayed substantially while the frame is displayed so that the user perceives them as being displayed together at the same time.

In step **409**, a location on the viewscreen is determined for each of objects for which a computer graphics display

engine routine is executing. In step **411**, each of the objects for which a computer graphics display engine routine is executing that are still within the view of the viewer are rendered. Optionally, the computer graphics display engine routine for any object that has moved so that it is no longer within the view of the viewer may be deleted. However, such computer graphics display engine routines should only be deleted provided that it is known that the motion path of the object or the viewpoint of the viewer will not again bring that object into view.

The video frame is displayed in step **413**. Control then passes from both steps **411** and **413** to step **415**. In step **415** the next video frame is advanced to, provided that there is one. This may be achieved by incrementing or otherwise updating the value of the frame pointer. Thereafter, control passes back to step **403** and the process continues as described above.

In another implementation of the basic process of FIG. **4**, the video screen is moving within the overall three-dimensional world being displayed to the user. Instead of determining which objects require the initiating of popping out based on information about objects in the frame being displayed on the video surface, as described above, the initiation may be based on the current location of the video screen within the overall three-dimensional world being displayed to the user. For example, if the video screen is displaying a video which gives the user the feeling of traveling down the Champs Elysees each successive video frame is actually a representation of the view from a location further and further down the street. As the frames are displayed and the user's viewpoint moves further down the street, it may be necessary for objects, e.g., a bus, a pedestrian, or a parked car, to pop off the video screen and become represented by computer graphics. The computer graphics display engine routine for each of the objects may be initiated as a function of the distance traveled by the video screen down the street, which, for example, may be either indicated in additional information associated with the frame, or, for simple situations, determined as a predetermined function of the time that the video has been running.

In another embodiment of the invention, a three-dimensional world ready for rendering, including all the elements that must pop out of the video surface, is modeled in memory. The three-dimensional world includes information such as the spatial location, size and orientation for each of the elements that must pop out. Motion information for the pop out elements may also be included. In this embodiment, the video screen is moving within the overall three-dimensional world that is being displayed to the user, as described above. Each frame of the video has spatial information which describes the location of the video screen within the three-dimensional world stored in memory. Such information may be implied, e.g., if the video screen is moving at a constant rate of speed, or it may be in separate information that is associated with the video frame. Using the information about each video pop out element as well as the information about the location of the video screen allows the spatial location of each video pop out element, as well as the portion of each video pop out element that is not blocked by the video screen and is within the viewpoint of the user, to be determined for each frame. Therefore, when the video screen is at a particular location, the portion of any video pop out element that is visible, e.g., in front of or to the side of, above, or below, the video screen may be rendered on the display. Thus, a match may be achieved between what is seen on the video screen and the computer graphic pop out elements.

A process for implementing this embodiment is shown, in flow chart form, in FIG. **5**. Note that prior to entering the process shown in FIG. **5** a three-dimensional world including all the elements that must pop out of the video surface must be pregenerated and stored in memory. Also, spatial information which describes the location of the video screen within the three-dimensional world must be associated with frames of the video and stored in memory.

The process is entered in step **501** when the user selects a video to view and the first frame of the video is to be displayed to a user. In step **503**, the video frame to be displayed is retrieved. This may be achieved by retrieving data representing the frame which is pointed to by a pointer. Such a frame pointer is set initially, e.g., in step **501**, to point to the first frame of the video. In step **505**, the location of the video screen within the three-dimensional world is determined. As noted, such information may be implied, e.g. if the video screen is moving at a constant rate of speed, or it may be in separate information that is associated with the video frame. Next, in step **507**, the visible portion of any pop out elements is determined as a function of the current video surface location and the user viewpoint.

Thereafter, steps **507** and **509** are performed substantially in parallel. The degree of parallelism to be achieved should enable the popped out objects to be displayed substantially while the frame is displayed, so that the user perceives them as being displayed together at the same time. In step **507**, the determined visible portion of each of the pop out elements is rendered. The video frame is displayed in step **509**. Control then passes from both steps **507** and **509** to step **511**. In step **511** the next video frame is advanced to, provided that there is one. This may be achieved by incrementing or otherwise updating the value of the frame pointer. Thereafter, control passes back to step **503** and the process continues as described above.

The foregoing assumes that the video frame to be displayed is set, which determines the location of the video screen within the three-dimensional world. However, the converse may also be implemented, i.e., the location of the video screen within the three-dimensional world is set, and this determines which video frame is to be displayed. To do so, in step **501** or **511**, in which the video frame to be displayed next is determined, the desired location of the video screen within the three-dimensional world is ascertained. This location may be specified as a function of user input. For example, if the scene being displayed corresponds to the view of a user on a bicycle, the location of the video screen may be determined by sensors mounted to a stationary bicycle which detects riding of the bicycle by the user. A search of the information identifying the location of the frames is conducted to determine which frame corresponds to the current location of the screen, and the frame pointer is set to point to that frame.

The various method of determining which frame is displayed may be used separately, or their usage may be intermixed, depending on the need of the application being implemented.

Note that frames for which it is known that no pop out elements will be displayed need not be associated with spatial information which describes the location of the video screen within the three-dimensional world stored in memory. The video is simply displayed on the video screen and no pop out elements are rendered.

Any prestored information, such as frames, and information associated therewith, as well as models of the three-dimensional world, may be stored in different segments.

Such segments may be located at a single physical location, e.g., within a single computer, or at different physical locations, such as in various computers that are connected by a network, and made available for use with embodiments of the invention. Moreover, the elements which process the information to generate the display may, but need not be, contained within a single computer.

One way that an object which pops out from a video into the computer graphics part of the world may be "investigated" by a viewer of the world, in accordance with the principles of the invention, is by receiving an indication of a selection of such an object by a user and, in response thereto, providing the user with additional information about the selected object. For example, additional information could be displayed on the display screen in response to the viewer selecting the object, such as with point and click selection system, the most common type of which are mice, trackballs, and touchpads. Alternatively, in response to the user selection, a new window could be overlayed on the video display containing additional information. Another way that this may be achieved is by receiving an indication of a selection of such an object by a user and, in response thereto, allowing the user to explore within the selected object. This may be done within the context of the world which is being explored or external thereto. One way this may be achieved is by having a uniform resource locator (URL) associated with the object in the CG part of the world. When the object is selected by the view, the viewer is taken to a page or file corresponding to the URL. Alternatively, the viewer may be jumped to another world model which corresponds to the object being further explored.

For example, if the user is bicycling down the Champs Elysees in Paris, France, as described above, and, as the Arc de Triomphe is passed by the bicyclist it pops out of the video, the user could click on the popped-out Arc de Triomphe which is now in the computer graphics part of the world and obtain historical information about it, e.g., displayed in a window on the screen. Alternatively, if the user is represented in the world as an avatar riding on a bicycle, the user avatar, in response to appropriate commands, such as mouse clicks, could be made to dismount the bicycle and further investigate the Arc de Triomphe, e.g., entering therein, ascending a set of stairs and looking out from one or more viewpoints. The user could then cause his avatar to return to the bicycle and continue the journey in the world which has a portion of the world distant from the point of view of the user represented in only two dimensions as a video on the video screen and the remainder of the world as computer graphics. The description of the interior of the Arc de Triomphe may have been directly associated with information employed for popping it out of the video or information pointing to the necessary description of the interior of the Arc de Triomphe, such as a pointer to another "world" or a URL, may have been directly associated with information employed for popping the Arc de Triomphe out of the video.

As another example, the user could enter a store which popped out of the video, and engage in virtual shopping therein. In accordance with an aspect of the invention, the particular store which is actually entered may be customized on a per user basis. Thus, for different users who are traversing the same course and seeing the same representations, e.g., an avatar, of a store or vendor cart that popped out from the video, who is the particular vendor that will serve the user and provide him with the virtual shopping service may be different for different users. In accordance with an aspect of the invention, the particular vendor may be selected as a function of the actual geographic location of the user, or a particular location that is associated with the user. If there is more than one user who are simultaneously exploring the same world together, e.g., two friends bicycling together, in accordance with an aspect of the invention, each friend may be served by a different vendor, e.g., as a function of their individual geographic locations. Alternatively, even if there is more than one user, and such users would otherwise be served by different vendors, e.g., as a function of their respective locations, in accordance with an aspect of the invention, such users could specify that a subset, or all of them, should be served by a single vendor.

In accordance with another aspect of the invention, when the proprietor of a virtual store, or his representative, e.g., electronic agent, detects the avatar of one or more persons passing the avatar of a store for which such proprietor's store corresponds to the virtual store for such passing persons, a message, such as an advertisement, or other communication, such as opening a communication channel, e.g., a chat service or voice communication channel, may be transmitted to, or initiated with, such passing persons. The communication may be general in nature or it may be customized as a function of information available regarding the passing persons. Advantageously, a feeling of community may be engendered in the virtual environment

FIG. **6** shows steps of a process by which aspects of the invention may be implemented. The process of FIG. **6** is entered in step **601**, which may be, for example, after completion of execution of step **411** of FIG. **4** or step **507** of FIG. **5**. Thereafter, in step **603**, additional information which is necessary to support the permitted interaction between the viewer and the popped out object and is beyond what is necessary to simply generate the computer graphics visual model of the object is retrieved. Such information may be included along with the information associated with the video that is used to pop the object out of the video. In step **605** any geographic functions associated with the object are resolved. For example, if the object which popped out of the video was a vendor's cart, such as may be found when bicycling around Central Park in New York City, the geographic function may specify a restaurant of the type that serves the same kind of food that is available from vendor cart. Such food may include, for example, frankfurters, hamburgers, sodas and snacks. The type of restaurant that corresponds to the cart is then used along with the actual physical location in the real world of the user, e.g.. Omaha, Neb., to determine a local restaurant that serves food of the same type and provides delivery service. The information provided by exploring the cart is linked to information corresponding to the determined restaurant, e.g., available menu selections and prices therefor. The viewer may order an item from the restaurant by manipulating objects on the cart, and the restaurant could then deliver them directly to the viewer. Advantageously, users who are in different real world locations but are jointly negotiating a virtual world, may be supplied with substantially the same services, enhancing their experience in the virtual world. When there is more than one restaurant to which the object may be associated, the resolution of the object may also be made dependent upon knowledge about the user, such as may be stored in a user profile.

Next, in step **607**, a communication channel may be enabled between the popped out object and an entity, which may have been geographically resolved as described above. For example, if the popped out object is the above-described vendor cart, a communication channel may be opened to the corresponding restaurant, or an agent therefor. The restau-

rant may transmit a message, such as "Get your hot dogs and cold soda here." The message may be manifest by having an avatar of a vendor behind the cart appear to speak the message, either using text-to-speech or by having a representation of the speech transmitted directly. A so-called "chat" service may be used to enable bidirectional communication between the viewer and the vendor.

Another exemplary object to which a communication channel may be opened is a billboard. Such billboards may operate in one of several ways. For example, the billboard when popped out may signal an advertiser of the approach of a potential customer and in response thereto the advertiser may immediately transmit a message to the billboard, in accordance with an aspect of the invention. The particular advertiser selected may be fixed worldwide for all viewers, or it may be geographically resolved for each viewer. Alternatively, the billboard when popped out may signal an advertiser of the approach of a potential customer and enable the advertiser to transmit a message to the billboard should the advertiser wish to do so, e.g., after having reviewed information which may be sent to it about the viewer, in accordance with an aspect of the invention.

The process exits in step **609** and then the processes of FIGS. **4** or **5** may be resumed.

The process of FIG. **6** need not be limited to occurring within the time span of one frame.

Those of ordinary skill in the art will recognize that any simulation of a joint exploration of a world may employ the principles of the invention. For example, users exploring a world may take together automobile rides, boat rides, plane rides, train rides, and even spaceship rides. A rowboat ride may be arranged for users having rowing machines which are coordinated with images of the world seen by the users. Alternatively, the users may be walking together through the world, e.g., each user walks on his own treadmill which is coordinated with images of the world seen by the users. Similarly, users can ski together, e.g., each is on a skiing simulator machine, such as a Nordictrak, which is coordinated with the images of the world seen by the users. In addition, other forms of commercial transactions may be engaged in besides shopping. For example, users motoring down a virtual highway together may encounter a toll booth which pops out of the screen, and at least one of the users must pay the toll before their exploration of the world is allowed to proceed. Similarly, users may approach an attraction such as a virtual amusement park or a virtual safari. Ticket booths which appear on the video screen may pop out from the video screen and the users must each obtain, e.g., buy, or have bought for them, a ticket in order to proceed into the attraction.

The foregoing merely illustrates the principles of the inventions. It will thus be appreciated that those skilled in the art will be able to.devise various arrangements which, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope.

What is claimed is:

1. A method for use in accessing an object in a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of objects, the method comprising the steps of:

determining that an object which is represented as part of said video on said video screen has moved, from the point of view of a viewer of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

changing the representation of said object from a video representation to one modeled as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world;

receiving an indication of a selection of said object by said viewer when said object's representation is modeled as computer graphics; and

accessing additional information about said selected object.

2. The invention as defined in claim **1** wherein said object is a billboard.

3. The invention as defined in claim **1** wherein said object is a store.

4. The invention as defined in claim **1** wherein said object is a vendor stand.

5. The invention as defined in claim **1** wherein said object is a garage sale.

6. The invention as defined in claim **1** wherein said additional information is determined as a function of specified parameters of said viewer of said world.

7. The invention as defined in claim **1** wherein said additional information is determined as a function of a location in the real world of said viewer of said world.

8. The invention as defined in claim **1** wherein said additional information is determined as independent of a location in the real world of said viewer of said world.

9. The invention as defined in claim **1** wherein said additional information is determined as a function of preferences of said viewer of said world.

10. The invention as defined in claim **1** wherein said object is a store selected from among a plurality of stores as a function of a location of said viewer and said additional information is relevant to objects for sale at said store.

11. The invention as defined in claim **1** wherein said object is a store selected from among a plurality of stores as a function of specified parameters of said viewer and said additional information is relevant to objects for sale at said store.

12. The invention as defined in claim **1** further including the step of opening a communication channel between said viewer of said world and a location defined as a function of said additional information.

13. The invention as defined in claim **1** wherein said additional information is determined as a function of a location in the real world of said viewer of said world and further including the step of opening a communication channel between a viewer of said world and a location defined as another function of said additional information.

14. A method for use by a plurality of users in exploring a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of objects, the method comprising the steps of:

determining that an object which is represented as part of said video on said video screen has moved, from the point of view of at least one of said users, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

changing the representation of said object from a video representation to one modeled as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world;

receiving an indication of a selection of said object by a user when said object's representation is modeled as computer graphics; and

transmitting to at least at least two distinct subsets of said plurality of users additional information about said selected object;

wherein said additional information about said selected object that is supplied one of said at least two distinct subsets of said plurality of users is different from the additional information about said selected object that is supplied to another of said at least two distinct subsets of said plurality of users.

15. The invention as defined in claim **14** wherein said object is an avatar of a store and wherein said additional information supplied to said one of said at least two distinct subsets of said plurality of users relates to a first real world store and wherein said additional information supplied to said other one of said at least two distinct subsets of said plurality of users relates to a second real world store, said first and second stores being different.

16. The invention as defined in claim **15** wherein said additional information actually supplied to said one of said at least two distinct subsets of said plurality of users and to said other of said at least two distinct subsets of said plurality of users is determined as a function of defined parameters regarding said one and said other distinct subsets.

17. A method for use in accessing an object in a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of object, the method comprising the steps of:

determining that an object which was represented as part of said video on said video screen has moved, from the point of view of a user of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

changing the representation of said object from a video representation to one modeled as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world; and

opening a communication channel when an avatar of said user is within a specified distance of said object in said first portion of said world when said object's representation is modeled as computer graphics.

18. The invention as defined in claim **17** wherein said communication channel connects to a display avatar in said world.

19. The invention as defined in claim **17** wherein said communication channel connects to a billboard avatar in said world.

20. The invention as defined in claim **17** wherein said communication channel connects said user and an actor on behalf of said object.

21. The invention as defined in claim **20** wherein said actor is an autonomous agent representing said object.

22. The invention as defined in **17** wherein said communication channel is presented as a advertisement avatar in said first portion of said world.

23. The invention as defined in **17** wherein said communication channel is a voice channel.

24. The invention as defined in **17** wherein said communication channel is a data channel.

25. The invention as defined in **17** wherein said communication channel is a chat session.

26. A method for use in accessing an object in a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of objects, said world being explored by a plurality of users, the method comprising the steps of:

determining that an object which was represented as part of said video on said video screen has moved, from the point of view of a user of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

changing the representation of said object from a video representation to one modeled as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world; and

opening a plurality of communication channels when an avatar of said user is within a specified distance of said object in said first portion of said world when said object's representation is modeled as computer graphics.

27. The invention as defined in claim **26** wherein a first of said communication channels connects said user and an actor on behalf of a first real world item represented by said object and a second of said communication channels connects said user and an actor on behalf of a second real world item represented by said object, said first and second actors being different.

28. The invention as defined in claim **26** wherein said a first communication channel of said plurality of communication channels connects to a first billboard avatar in said world and carries thereto, for display thereon, a first message and a second communication channel of said plurality of communication channels connects to a second billboard avatar in said world and carries thereto, for display thereon, a second message, said first message being different from said second message.

29. The invention as defined in claim **26** wherein a first communication channel of said plurality of communication channels connects said user and an actor on behalf of said object and a second communication channel of said plurality of communication channels connects a second user and another actor on behalf of said object, said first actor being different from said second actor and each of said first and second actors representing different respective real world items that are each represented in said world by said object.

30. A method for use in processing a view of a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of objects, the method comprising the steps of:

determining that an object which is represented as part of said video on said video screen has moved, from the

point of view of a viewer of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

revealing a representation of said object as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world;

accessing additional information about said object not required to display said object as said computer graphics to said viewer having a viewpoint external to said object when said object's representation is modeled as computer graphics.

31. The invention as defined in claim **30** further including the step of prestoring said representation of said object as computer graphics.

32. The invention as defined in claim **30** further including the step of displaying said additional information to said viewer.

33. The invention as defined in claim **30** further including the step of displaying said additional information to said viewer in a window distinct from said computer graphics.

34. The invention as defined in claim **30** wherein said video displayed an exterior view of said object and wherein said additional information includes information for generating an interior view of said object.

35. A method for use in processing a view of a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video displayed on a video screen which exists in said first portion of said world, wherein said video is made up of a sequence of images, the method comprising the steps of:

determining that an object which is represented as part of said video on said video screen has moved, from the point of view of a viewer of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

revealing a representation of said object as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world;

arranging a data structure for said object as computer graphics so that said viewer can access other information about said object other than a view of its representation as computer graphics which was revealed as it moved to said location modeled as computer graphics when said object's representation is modeled as computer graphics.

36. A method for use in accessing an object in a three dimensional world in which a first portion of said world is modeled as computer graphics and a second portion of said world is represented by a video, wherein said video is made up of a sequence of images displayed on a video screen which exists in said first portion of said world, said video displaying a plurality of objects, the method comprising the steps of:

determining that an object which was represented as part of said video on said video screen has moved, from the point of view of a viewer of said world, to a location that is off of said video screen, so that said object can no longer be displayed on said video screen and will disappear from said world;

changing the representation of said object from a video representation to one modeled as computer graphics whereby said object remains visible in said world, albeit not on said video screen, and said video screen continues to exist in said world; and

arranging a data structure for said object as computer graphics so that said viewer can access other information about said object other than a view of its representation as computer graphics to which it was changed when said object represented by said video moved to said location modeled as computer graphics.

37. The invention as defined in claim **36** further including the steps of:

receiving an indication of a selection of said object by said viewer; and

accessing said additional information about said selected object.

38. The invention as defined in claim **37** wherein said additional information is displayed in a separate window.

39. The invention as defined in claim **37** wherein said additional information defines an interior view of said object.

40. The invention as defined in claim **37** wherein said additional information is used to associate said object with a real world object.

41. The invention as defined in claim **37** wherein said addtional information is used to associate said object with a real world object as a function of a real world location of said viewer of said object.

42. The invention as defined in claim **37** wherein said additional information is used to associate said object with a real world object as a function of preferences of said viewer of said object.

43. The invention as defined in claim **37** wherein said additional information is used to establish a communication channel between said object and a real world object as a function of a real world location of said viewer of said object.

44. The invention as defined in claim **37** wherein said additional information is used to establish a communication channel between said object and a real world object and wherein said real world object is selected as a function of a real world location of said viewer of said object.

* * * * *

US006381583B1

(12) **United States Patent**
Kenney

(10) **Patent No.: US 6,381,583 B1**
(45) **Date of Patent: Apr. 30, 2002**

(54) **INTERACTIVE ELECTRONIC SHOPPING SYSTEM AND METHOD**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/338,963**

(22) Filed: **Jun. 24, 1999**

Related U.S. Application Data

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(51) **Int. Cl.**[7] **G06F 17/60**
(52) **U.S. Cl.** **705/26**; 705/27; 703/6
(58) **Field of Search** 705/26, 27; 348/7, 348/8, 13, 12; 455/5.1, 6.3, 4.2; 703/6

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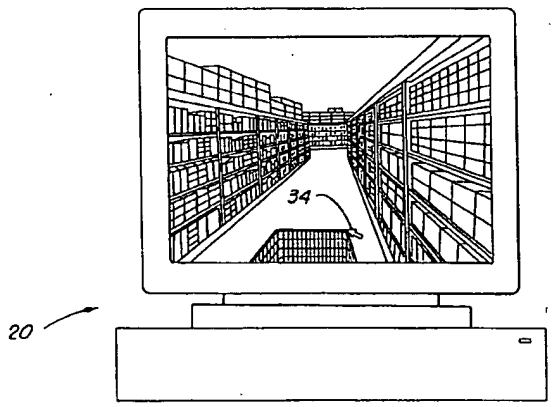
Assistant Examiner—Romain Jeanty
(74) *Attorney, Agent, or Firm*—McAfee & Taft

(57) **ABSTRACT**

An interactive electronic shopping system and method create a virtual shopping facility from an actual shopping facility, such as a grocery store, restaurant, or office. A shopper at a computer or other suitable display device can move through the virtual shopping facility and see replicas of what would be seen in moving through the actual shopping facility. Various lists of items selected for purchase can be made, and predetermined lists and information can be displayed. Changes in the actual shopping facility, such as a change in a display of goods, can be accommodated by replacing prior data with new data so that the virtual shopping environment is kept current with the actual shopping facility.

7 Claims, 7 Drawing Sheets



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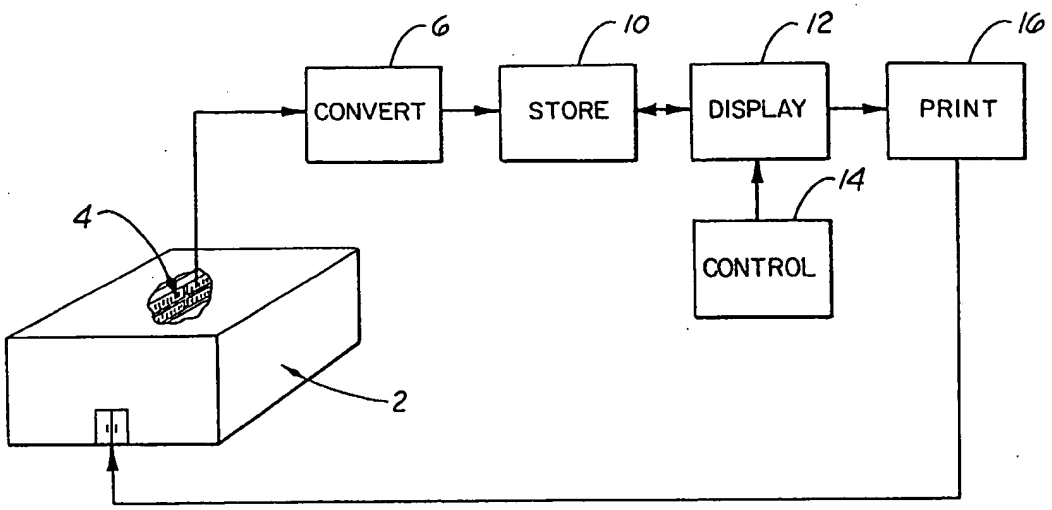
6
10
12
16
CONVERT
STORE
DISPLAY
PRINT
14
CONTROL
4
2

FIG. 1

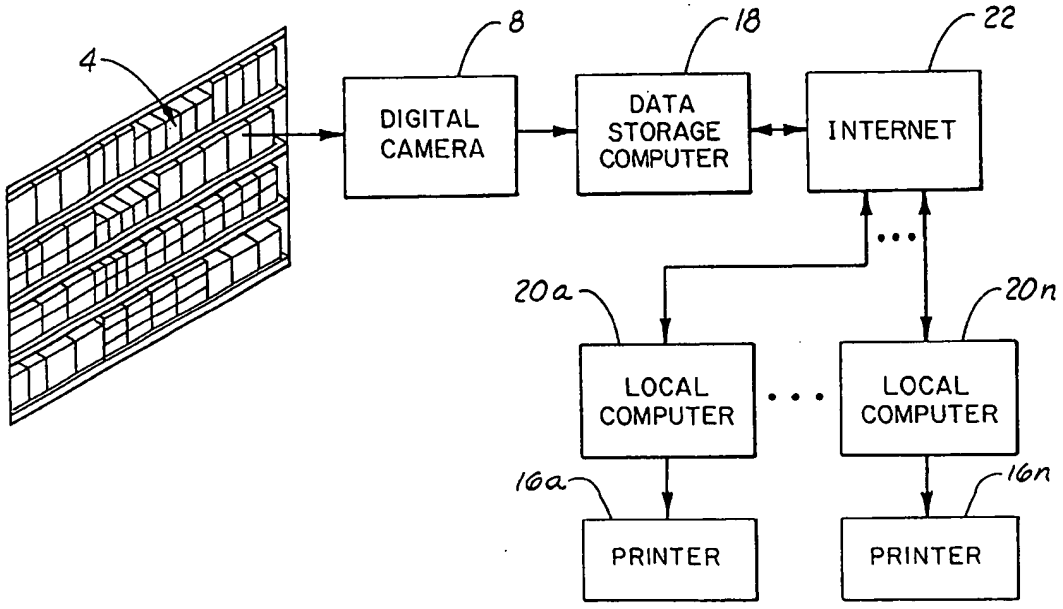
8
18
22
4
DIGITAL CAMERA
DATA STORAGE COMPUTER
INTERNET
20a
20n
LOCAL COMPUTER
LOCAL COMPUTER
16a
16n
PRINTER
PRINTER

FIG. 2

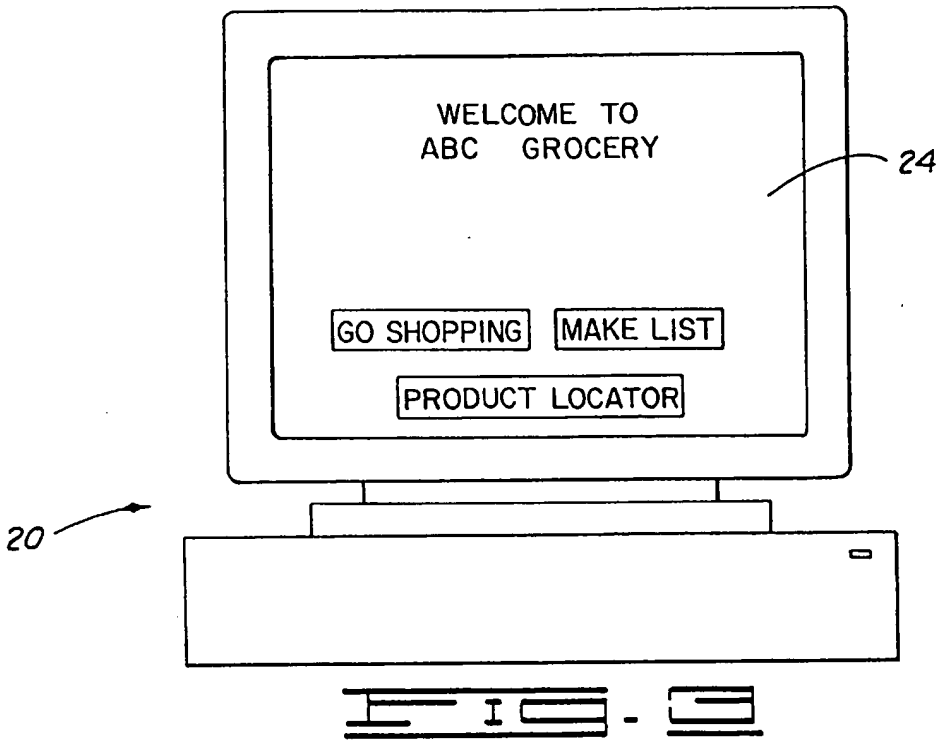
WELCOME TO
ABC GROCERY
24
GO SHOPPING
MAKE LIST
PRODUCT LOCATOR
20

FIG. 3

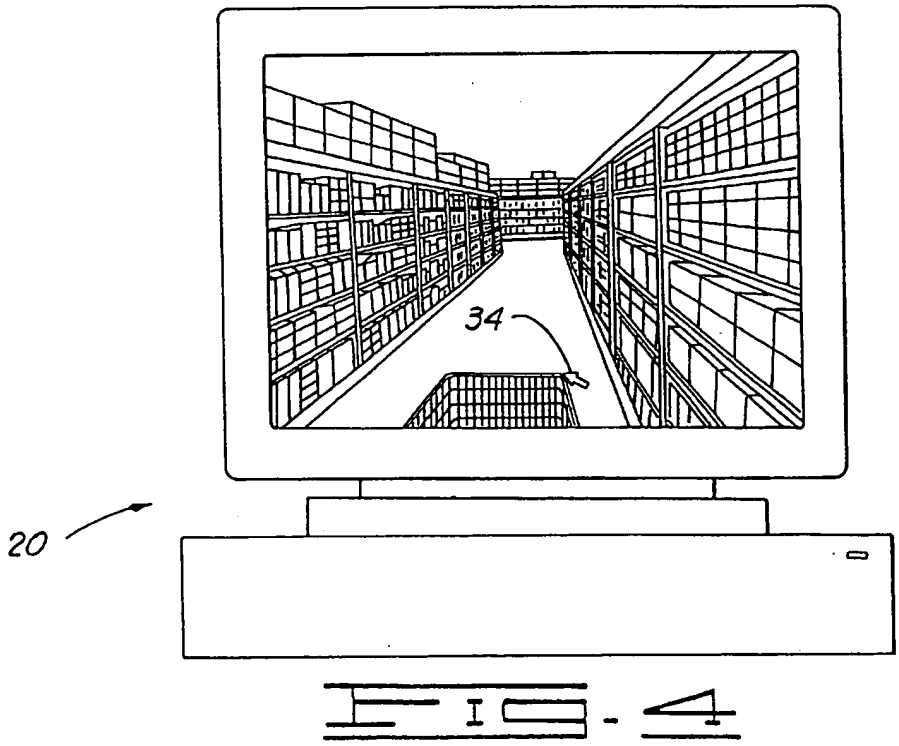
34
20

FIG. 4

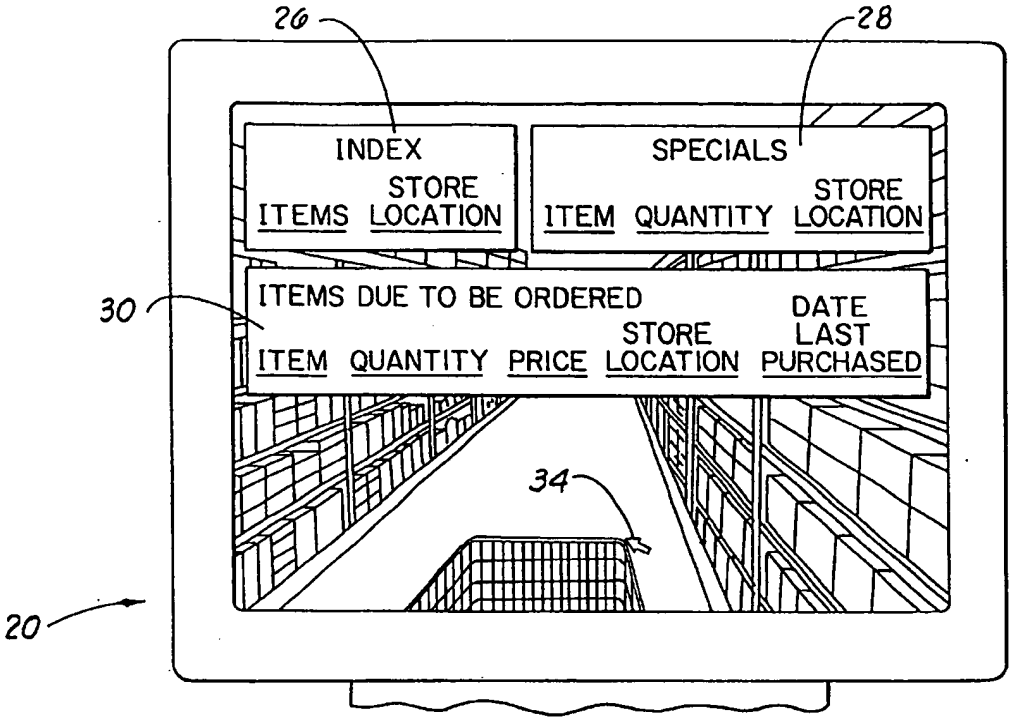
26
28
INDEX
ITEMS
STORE LOCATION
SPECIALS
ITEM
QUANTITY
STORE LOCATION
30
ITEMS DUE TO BE ORDERED
ITEM
QUANTITY
PRICE
STORE LOCATION
DATE LAST PURCHASED
34
20

FIG. 5

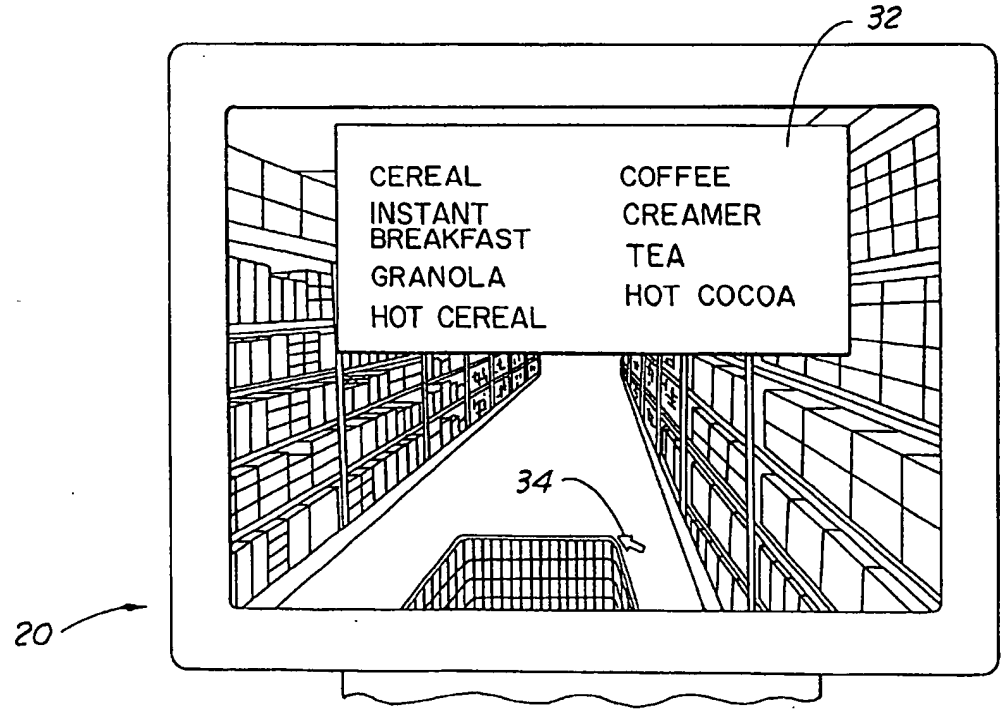
32
CEREAL
INSTANT BREAKFAST
GRANOLA
HOT CEREAL
COFFEE
CREAMER
TEA
HOT COCOA
34
20

FIG. 6

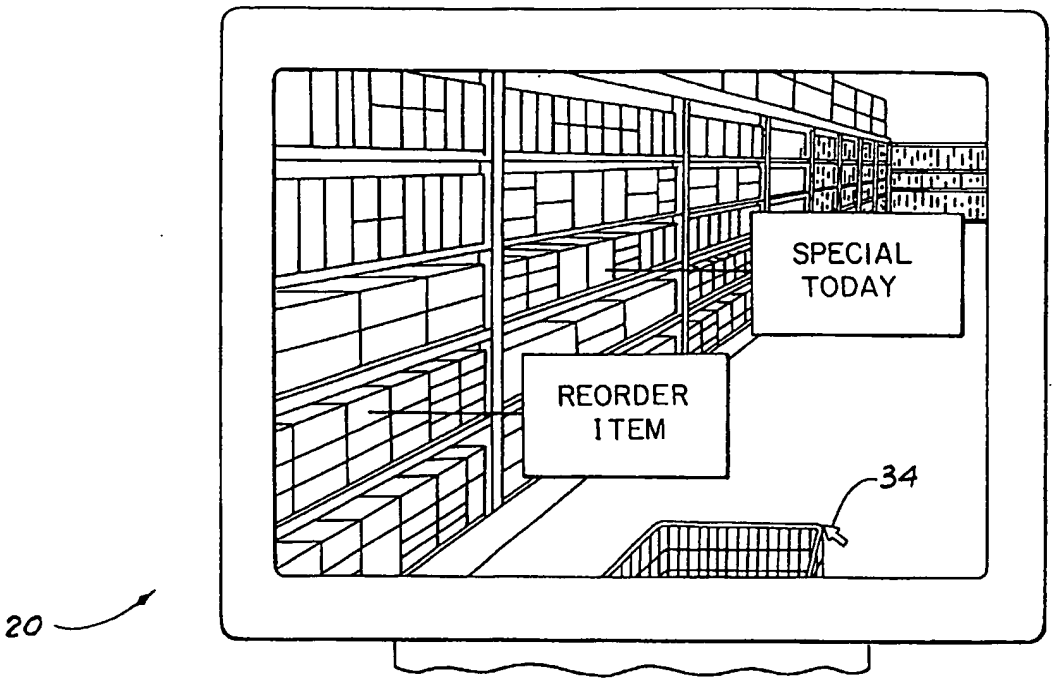

FIG. 7

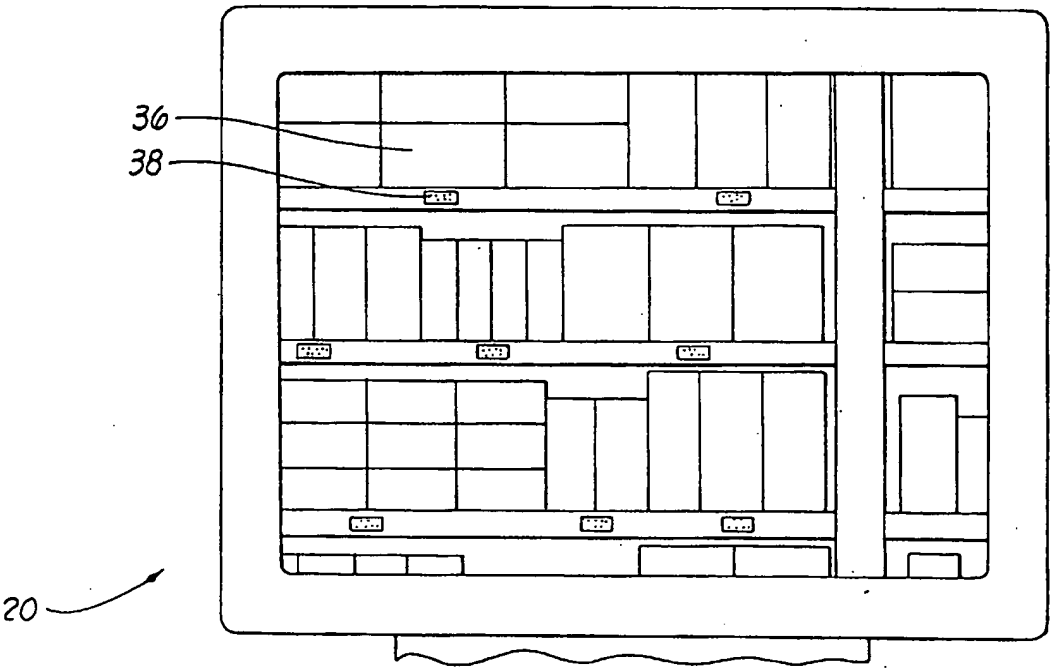

FIG. 8

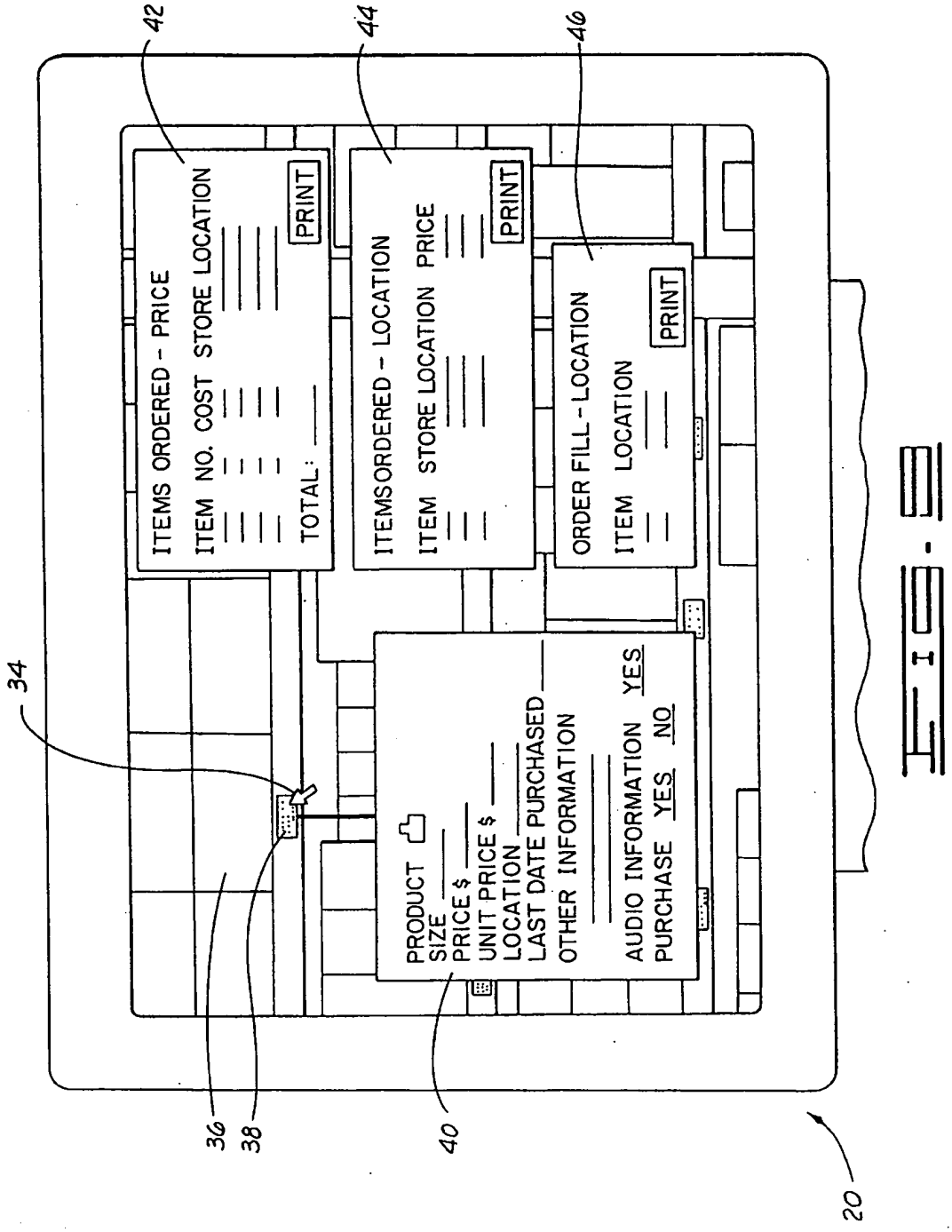
42
44
46
ITEMS ORDERED - PRICE
ITEM NO. COST STORE LOCATION
PRINT
TOTAL:
ITEMSORDERED - LOCATION
ITEM STORE LOCATION PRICE
PRINT
ORDER FILL - LOCATION
ITEM LOCATION
PRINT
34
PRODUCT
SIZE
PRICE $
UNIT PRICE $
LOCATION
LAST DATE PURCHASED
OTHER INFORMATION
AUDIO INFORMATION YES
PURCHASE YES NO
36
38
40
20

FIG. 5

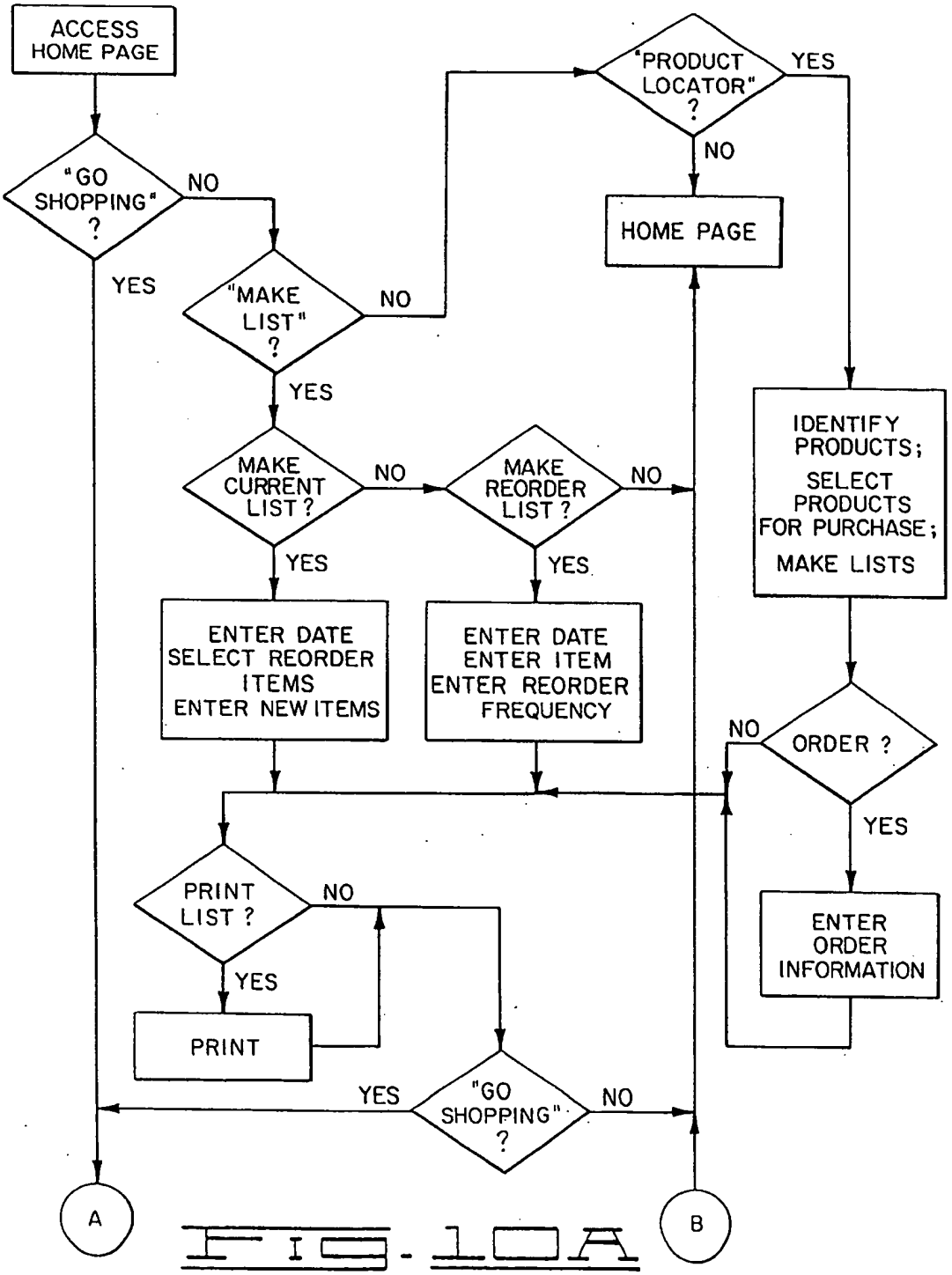
ACCESS HOME PAGE
"GO SHOPPING" ?
NO
YES
"MAKE LIST" ?
NO
YES
MAKE CURRENT LIST ?
NO
MAKE REORDER LIST ?
NO
YES
YES
ENTER DATE SELECT REORDER ITEMS ENTER NEW ITEMS
ENTER DATE ENTER ITEM ENTER REORDER FREQUENCY
PRINT LIST ?
NO
YES
PRINT
YES
"GO SHOPPING" ?
NO
A
"PRODUCT LOCATOR" ?
YES
NO
HOME PAGE
IDENTIFY PRODUCTS; SELECT PRODUCTS FOR PURCHASE; MAKE LISTS
NO
ORDER ?
YES
ENTER ORDER INFORMATION
B

FIG-10A

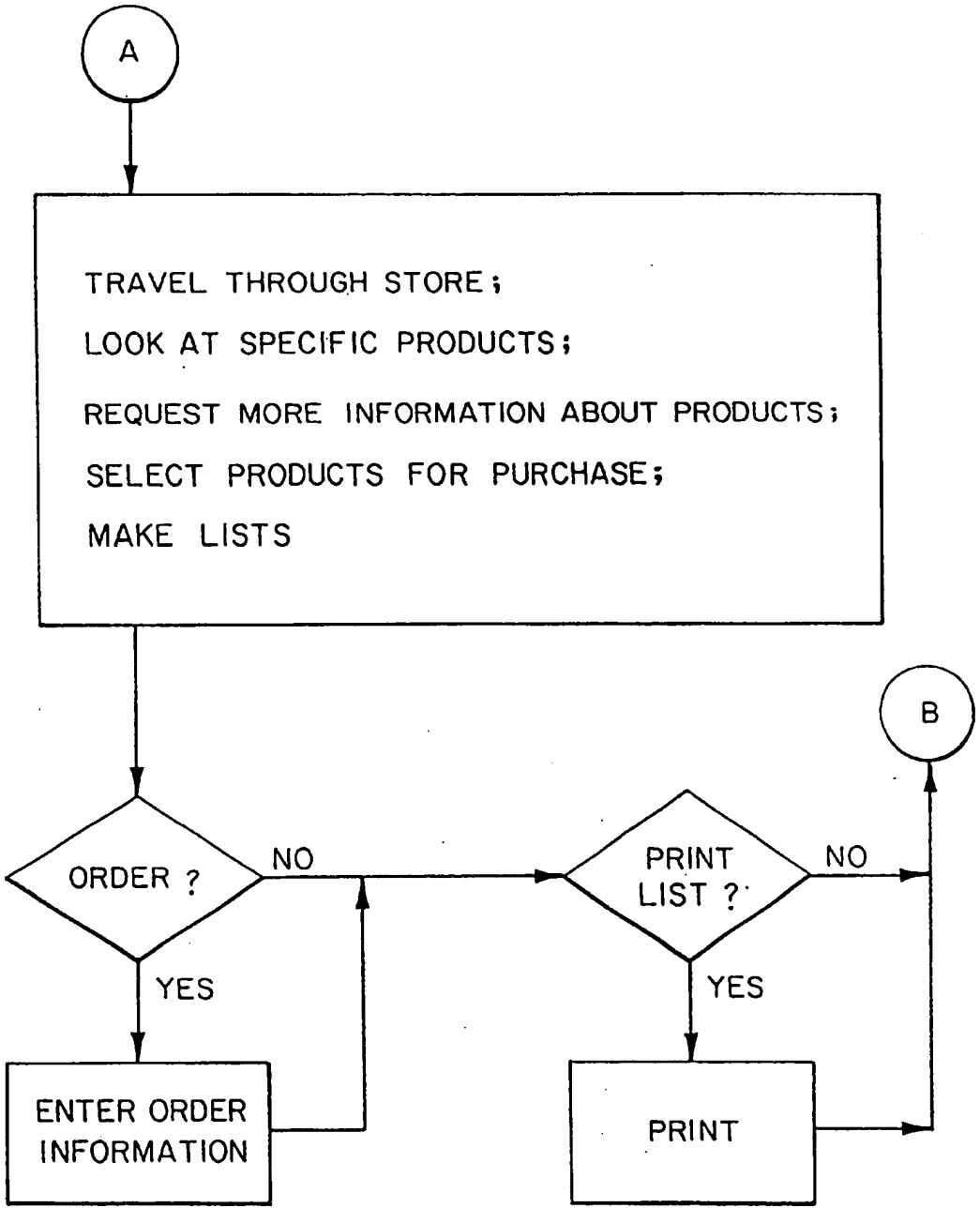
A
TRAVEL THROUGH STORE;
LOOK AT SPECIFIC PRODUCTS;
REQUEST MORE INFORMATION ABOUT PRODUCTS;
SELECT PRODUCTS FOR PURCHASE;
MAKE LISTS
B
ORDER ?
NO
YES
PRINT LIST ?
NO
YES
ENTER ORDER INFORMATION
PRINT

FIG. 10B

INTERACTIVE ELECTRONIC SHOPPING SYSTEM AND METHOD

This application is a continuation of copending application Ser. No. 08/838,087 filed on Apr. 15, 1997.

BACKGROUND OF THE INVENTION

This invention relates generally to interactive electronic shopping systems and methods and more particularly, but not by way of limitation, to such systems and methods utilizing the Internet so that an individual shopper can access shopping information from his or her home or office, for example.

Commercial use of the Internet, and particularly the World Wide Web, presently allows some degree of investigation and ordering of products offered for sale. The convenience that this can offer to a shopper would be enhanced with regard to at least some types of shopping if the shopper could see a virtual reproduction of an actual store and the products offered there as they are actually displayed at the store. Convenience would also be enhanced if the shopper could examine the displayed products in a manner similar to how one would at the actual store.

Further convenience would be added by creating one or more lists of what the shopper may need to buy based upon historical or predetermined ordering patterns or upon actual selections at the time the shopper is moving through the virtual store shown on the shopper's display.

Thus, there is the need for a video-based digitally implemented interactive electronic shopping system which allows a customer to view the contents of a particular shopping facility in a format that provides the feeling of shopping for the items in that particular facility. Use of this should be available at the customer's home or business through a convenient device, such as a personal computer, television or other consumer type electronic visual display device.

SUMMARY OF THE INVENTION

The present invention provides a novel and improved interactive electronic shopping system and method that satisfy the aforementioned needs for making shopping more convenient to the shopper. Using the present invention, a shopper can browse through a virtual duplicate of an actual store in a manner similar to being in the actual store itself. The shopper can examine individual products, and select or not select ones for purchase. Through the selection process, one or more types of lists can be created (e.g., alphabetical or by location in the store). Historical lists based on past ordering and predetermined buying frequency can also be provided. Special displays or information can also be provided to alert the shopper to specials on particular products. Products can be located through a directory that correlates all the products with their respective locations in the store. Changes at the actual store can be implemented in the virtual store.

This invention benefits the marketer of the products because, for example, it allows for customer loyalty to be developed since the exact depiction of the marketer's store actually enables the customer to become very familiar with the store and its particular products and to stay abreast of changes. It also enables a customer to reduce the actual shopping time and to ease or enhance the shopping experience.

An interactive electronic shopping system of the present invention comprises: means for converting images of a shopping facility into encoded digital signals representing the images as would be seen by a shopper at a physical embodiment of the shopping facility; means for storing the encoded digital signals in a computer data base; means for displaying a video representation of the shopping facility in response to the stored encoded digital signals; and control means for the shopper to control the means for displaying such that the means for displaying causes the displayed video image to change at the shopper's command to correspond to what the shopper would see were the shopper to move through a physical embodiment of the shopping facility.

In a particular implementation, the interactive electronic shopping system comprises: a digital camera to digitize a shopping facility into digital signals representing images of the shopping facility; a central computer data base to store the digital signals; a communication link connected to the central computer data base; a local computer connected to the communication link; and a control interface connected to the local computer to enable a shopper to control the local computer such that the local computer obtains data from the central computer data base in response to the digital signals stored therein and displays video images of the shopping facility in response to the obtained data.

The present invention also provides a method of creating a virtual shopping facility for interactive shopping by computer. This method comprises: selecting a physically embodied shopping facility in which a shopper can purchase from among a plurality of products; converting images of at least a portion of the shopping facility and the plurality of products into encoded digital signals; storing the encoded digital signals in a computer storage medium; and providing access to the stored encoded digital signals such that portions of the stored encoded digital signals are selectable and transmissible to a computer for displaying, on a monitor of the computer, virtual movement within a visual representation of the shopping facility and for permitting examination of visual representations of selected products in response to selected stored encoded digital signals.

The present invention also provides a computer-implemented method of simulating movement of a shopper through a shopping facility to enable an individual to observe, inspect and select a product in the shopping facility through operation of a computer. The method comprises: selecting a shopping facility having a known configuration of products displayed at the selected shopping facility such that a shopper can move among the displayed products to observe, inspect and select from among the displayed products; simulating the configuration of displayed products in a computer, including translating the known configuration of displayed products into encoded configuration-defining electrical signals in memory of a first computer and using the electrical signals to create in a second computer video representations of the configuration of displayed products; indicating to at least the second computer a first position of a shopper in the shopping facility and displaying through a monitor of the second computer the video representation of the configuration of displayed products at the first position; and indicating to at least the second computer a continuous change from the first position to a second position and displaying through the monitor of the second computer a changing video representation of the configuration of displayed products corresponding to a moving scene the shopper would see in moving from the first position to the second position in the shopping facility.

The present invention still further provides a computer-implemented method of making a shopping list for purchas-

ing products from a shopping facility, comprising performing each of the following steps using a computer: accessing a predetermined data base of encoded electrical signals representing a shopping facility and products available for purchase from the shopping facility; retrieving from the data base a sequence of the encoded electrical signals and displaying moving images of at least a portion of the shopping facility and products to simulate movement through the portion of the shopping facility in response to the retrieved sequence of encoded electrical signals; and selecting displayed products and making a list of the selected displayed products.

Therefore, from the foregoing, it is a general object of the present invention to provide a novel and improved interactive electronic shopping system and method. Other and further objects, features and advantages of the present invention will be readily apparent to those skilled in the art when the following description of the preferred embodiments is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of the preferred embodiment system of the present invention.

FIG. **2** is a block diagram of a particular implementation of the preferred embodiment system of the present invention.

FIG. **3** is a representation of an illustrative screen display at a local computer of the particular implementation of FIG. **2**.

FIG. **4** is a representation of another illustrative screen display at the local computer represented in FIG. **3**.

FIGS. **5** and **6** are representations of alternatives for the screen display of FIG. **4**.

FIG. **7** is a representation of still another illustrative screen display at the local computer represented in FIG. **3**.

FIG. **8** is a representation of a further illustrative screen display at the local computer represented in FIG. **3**.

FIG. **9** is a representation of a still further illustrative screen display at the local computer represented in FIG. **3**.

FIGS. **10A–10B** show a flow chart of part of the method of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Overview

A digital camera provides an inexpensive and versatile way for a store owner to electronically capture images of the store's contents for computerized interactive viewing by its customers. The present invention uses this to enable a viewer of a display screen to visually proceed through a virtual embodiment of the store in a fashion similar to walking up and down aisles at the actual store. The viewer can view items on each aisle with the ability to move closer to read images of actual labels on products on shelves or in displays. The digitization of the images generates electronically stored data that allows for efficient substitution of new images if products are moved or changed in a store. Items that the store chooses to highlight, such as for "sale" or "special" items, can flash or otherwise be made distinctive as the customer approaches them on the virtual journey through the displayed store.

"Hot spots" are imposed upon the display screen, such as at the location of the store price label for a particular product or at a logical location before a display of one particular group of items. By "mouse" double click or touch of an indicator on the hot spot, for example, a portion of the screen displays additional information concerning the item.

The additional information concerning an item includes any information desired. Examples are product size, price, unit price, last purchase date, location in the store, additional product advertisement including audio information, information concerning other sizes or related products available and a "yes" or "no" to order or place an item on a list. From the running list of items selected for purchase, additional lists can be automatically created. One such list could include a list of items ordered with the cost of each, the running total cost, and store location. A list arranged in order of store location could be selected for use in speeding time required for obtaining the items while in the actual store. If the order is to be filled by another party, the list could order the items for selecting from a warehouse or other storage location. Items which must be weighed or selected on a weight basis could be estimated based upon prior purchase history. Unique items such as flowers or vegetables could be ordered by category, number, and total cost or amount required (if applicable).

Additional lists can be automatically available at the beginning of the interactive virtual shopping session. These include pre-prepared lists of items routinely purchased, items purchased in the past, and items due for reorder based on prior purchase history.

One purpose of this invention is to allow persons that cannot or do not want to visit a store to send an order electronically to a store where personnel will select the items and either deliver them or hold them for pick up by the customer. Automatic electronic payment capability is preferably also available as a part of the order process.

The present invention enables pre-shopping of a particular store in the comfort of one's home, office or any location where a suitable electronic interface. (e.g., a computer having Internet access capability) is available. The information can be searched, selected and lists prepared for use while in the store, thereby reducing the shopping time. It also allows someone unfamiliar with the particular customer's desires or unfamiliar with the store to efficiently do the actual shopping using the lists produced.

This invention has particular application to any provider of goods or services where customers, clients or patients typically go to an actual shop, office or other physical facility. It is especially applicable to any merchandiser of consumer products including grocery stores, mass merchandisers of consumer goods such as variety or department stores, drug stores and other similar stores selling many items. Another specific application would allow a person to have the visual experience of walking into a restaurant, sitting down at a table, opening up a menu and ordering as if the person were in the restaurant. The order could be electronically transmitted for preparation for "carry out" or "delivery." The restaurant could create a video image of each of its menu items for display upon activation of a particular "hot spot" on the viewed menu. Unless otherwise stated or limited by a particular stated context, the terms "shopping facility" and "store" as used in this specification and the accompanying claims encompass all such places to which the present invention is applicable. The term "shopper" refers to a user of the present invention.

Preferred Embodiments of System and Method

An electronic shopping system in accordance with the present invention is represented in FIG. **1**. The system creates an electronically produced, electronically transmis-

sible visual replica of a display of goods or other objects at a shopping facility or other particular environment. The shopping facility is conveyed to a shopper through the present invention as a specific shopping environment to be met when the shopper is actually at the facility. This expedites the shopper moving through the actual facility because the shopper has familiarity with it. Any type of environment may be depicted; however, the present invention will be specifically described with reference to a conventional grocery store **2** having conventional aisles stocked with typical products **4**. It is to be noted, however, that other items, such as business cards, product brochures, business information, machines, personnel, meeting or examination rooms, etc., can be depicted.

The electronic shopping system of the present invention includes means **6** for converting images of the shopping facility into encoded digital signals representing the images as would be seen by the shopper at the physical embodiment of the shopping facility. The image converting means **6** can be used to provide any desired view that will produce a desired video replica of the shopping facility, particularly the interior environment and products of the facility. For example, the image converting means **6** can be used to generate electrical signals from which these features can be depicted at a distance for a broader view or close up to provide sufficient clarity to read significant product labeling.

A particular implementation of the image converting means **6** is a digital camera **8** shown in FIG. **2**. This can be a conventional known type of product that generates, in response to the received light emitted or reflected from the shopping facility features, digital signals representing these detected images of the shopping facility. The image converting means **6** can be implemented in other ways, such as by a scanner device using a pictorial representation of the shopping facility or by a computer operator using a known type of graphics program to create images on a computer (e.g., the computer operator could draw an image based on a picture of an actual location or based on an artist's rendering, or as a fictitious place if actual shopping by the user is not to occur). It is preferred, however, to use a digital camera as illustrated in FIG. **2** so that a substantially exact representation of the actual facility can be quickly obtained and ultimately displayed in the electronic shopping system of the present invention. Known types of photographic (e.g., telescopic lensing) or digital imaging techniques can be used in creating long range or close up views with desired detail.

The electric signals from the image conversion means **6** are stored in a suitable storage means **10** preferably forming part of a computer data base. The storage means **10** can be implemented in any suitable manner, such as by one central memory or multiple distributed memories, or individual memories (e.g., diskettes or CD-ROMs provided to the shoppers for their individual use at home or business). The storage means **10** of whatever type is used within the system such that data can be removed and replaced as changes are made in the actual facility **2**.

The data from the storage means **10** is used to provide a video representation of the shopping facility as presented through a display means **12** as represented in FIG. **1**. The display means **12** includes a video monitor of any suitable type, such as a computer monitor or a television screen, in conjunction with other conventional hardware and software that allow the downloading and use of the data from the storage means **10** in the display means **12**. The information downloaded can be downloaded all at one time or incrementally as specifically required. Visible images can be displayed either as still or moving images. Moving images are used to give the shopper at the display means **12** the sense of moving through the aisles of products in the grocery store **2** example.

The display means **12** is programmed to also include means for communicating information about the selected product to the shopper. This information communicated includes ordering information as well as other information as will become apparent below. The information communicated is information that has been previously entered into the data base of the storage means **10**. The information can be conveyed audibly through speakers forming part of the display means **12** or visibly through the aforementioned monitor or other display device of the display means **12**.

The display means **12** also includes means for generating and displaying one or more lists of products ordered. These lists can be provided in alphabetical order, or in a sequence according to the locations of the ordered products in the shopping facility so that the shopper can go to the actual facility and efficiently and expeditiously move through the facility to obtain the items to be purchased. The lists can be organized in any other suitable manner as well.

Another type of list that can be provided by the means for generating and displaying a list of the present invention is a list of products previously ordered by the shopper and the date each listed product was last ordered by the shopper. This type of list can also indicate the frequency with which each listed product has been ordered or is to be ordered by the shopper. One implementation of this is to program the display means **12** so that actual ordering or selecting of products is automatically tracked and a frequency computation made, such as either on the basis of the time since last ordering the same product or an average time based on a historical record of the orders for the same product. These lists are generated and displayed by suitable programming means within the display means **12** or as obtained from the storage means **10**.

The display means **12** can also display selected images that are visually distinctive relative to the video representations of other images to highlight these images to the shopper at the display means **12**. For example, certain products that are on "special" at the grocery store **2** might flash on the display screen of the display means **12**. Alternatively, there might be a text indication noting that such product is on special. Such distinctive display can be applied for other purposes, examples of which include goods that may need to be reordered, items that have been selected for current purchase, etc. This feature of distinctive display is implemented by means for modifying the respective encoded digital signals of the selected images so that the video representations of these selected images displayed by the display means **12** are visually distinctive to the video representations of other images not represented by modified encoded digital signals. The modification can be implemented by the tagging or linking technique referred to below whereby the programming commands which cause the image to flash or the "special" notification text to appear are linked with the respective signals defining the respective product image.

The electronic shopping system shown in FIG. **1** also includes control means **14** for the shopper to control the display means **12** such that the display means **12** causes the displayed video image to change at the shopper's command to correspond to what the shopper would see were the shopper to move through the physical embodiment of the shopping facility **2**. This includes a suitable interface device such as a mouse, keyboard, light pen, or touch screen

function that allows the shopper to indicate to the display means **12** that other video representations are to be displayed or that a product is to be more closely examined or ordered, for example. An example of this is to have the control means **14** allow the shopper to interact with the display of one aisle of the grocery store **2** with which a shopping cart image is also displayed. The control means **14** allows the shopper to cause the display means **12** to move the shopping cart down the aisle as if the shopper were pushing it. The control means **14** further allows the shopper to cause the display means **12** to stop at a desired part of the aisle, turn toward that particular part, and zoom in on a particular product. The control means **14** can also allow the shopper to cause the display means **12** to show movement of the selected product off the shelf for closer examination or for moving the displayed representation of the selected product into the represented shopping cart in the same manner as the shopper would actually function in the real grocery store **2**. The shopping cart representation is a specific embodiment of a selected product accumulation space. Another embodiment of such a space is a counter in a clothing store where a cash register is located and where the shopper would collect selected clothing items in moving them from the racks of clothing to purchase them. This also provides means for ordering the selected products in that the display means **12** can record the selections and add them to an order list. The control means **14** can provide for eliciting textual, graphical or audible information about the product (e.g., pull-down menus or windows containing the information).

The electronic shopping system shown in FIG. **1** also includes printing means **16** from which one or more selected lists can be printed. This allows the shopper to take the printed list and go to the actual grocery store **2** (or other represented facility) to perform the actual shopping. The present invention also contemplates, however, electronically ordering the selected item so that the facility **2** receives the electronic order, fills it and has the selected items ready for pick up by or delivery to the shopper as desired.

A particular implementation of the system shown in FIG. **1** is illustrated in FIG. **2**. A representation of one actual aisle of actual products **4** is digitized using the digital camera **8** referred to above. The digital signals output from the digital camera **8** are provided to a data storage computer **18** embodying the storage means **10** of FIG. **1**.

The display means **12** and the control means **4** of FIG. **1** are implemented in FIG. **2** at least in part by one or more local computers **20**. A communication link, illustrated in FIG. **2** as the Internet **22**, connects the data storage computer **18** with the local computers **20**. The data storage computer **18**, the one or more local computers **20** and the Internet **22** are used to embody the storage means **10**, the display means **12** and the control means **14** of the FIG. **1** embodiment. Particular functions and structures of the system can be implemented in either the data storage computer **18** or the local computer **20** as desired; however, in general, the main data base of digitized signals provided from the digital camera **8** is contained in the central data storage computer **18** and the control means **14** is part of each local computer **20** for the implementation of FIG. **2**. The display occurs at the local computer **20**, but particular programming to accomplish the functions of the present invention can reside in either the computer **18** or the computer **20** as desired. The computers **18** and **20** are of any suitable known type having enough memory and operating speed to handle the amount of data used in defining the shopping facility and the operations performed therewith. Preferably each computer **20** is a personal computer type or other comparable type readily usable by the shopper, and the computer **18** can be of this type or larger depending upon data handling capability required for a specific implementation. The printers **16** shown in FIG. **2** are of any desired conventional known type compatible with the respective computer **20** (e.g., laser, ink jet, etc.).

The communication link connecting the data storage computer **18** with the local computers **20** can include a telephone line, cellular link, cable television or other connection medium, but in general the local computers **20** will be remote from the data storage computer **18**. As mentioned, the particular implementation of FIG. **2** uses the Internet **22** as the communication link. The computer **18** and the computers **20** have suitable known programs to interface with the Internet and communicate over it to achieve the data acquisitions and transfers referred to in this specification.

The programming of the computer **18** and the computers **20** is, in general, known conventional programming which stores data, accesses data, communicates data, manipulates data, and displays data in manners known in the art. One significant aspect of the data handling is, however, that the digitized signals from the digital camera **8** need to be stored in the data storage computer **18** in a manner which allows particular portions of data associated with respective images displayed through the local computer **20** to be identified and independently manipulated. One way to do this is to create links or identifiers with the digitized video data so that it can be located and associated with other information. For example, identifiers can be spatial coordinates of the interior of the grocery store **2**. As the data is recorded by the digital camera **8** and stored in the computer **18**, the data of a particular portion of the store is associated in the data storage computer **18** memory with a respective x-y-z coordinate. Other identifiers could be manually assigned or otherwise associated by a programmer looking at an image on the screen of the local computer **20** and clicking on areas of products and assigning identifiers to those areas. In whatever manner is chosen, this allows a particular product or other visual segment shown on the screen of a local computer **20** to have a unique identifier to which other information can be associated. For example, this other information can be a set of encoded signals which cause the respective product to flash when it is displayed on the local computer **20** to indicate that that product is being offered at a special price or has been ordered or needs to be reordered. This also allows product information, selector "hot spots" and other features to be associated with respective products. This allows, for example, a hierarchy of classifications to be assigned to each product (e.g., "canned goods," "green beans," "(specific brand name)") to facilitate text-based searching for particular products or types of products. This still further allows for discrete or segmented replacement of data; for example, when a certain product or group of products is changed in the actual store, a corresponding change can be made to the stored signals in the data storage computer **18** by replacing or modifying only that data at the corresponding coordinates in the data base.

With the data entered, linked or tagged as described above, and formatted with appropriate associated information, the shopper at one of the local computers **20** accesses the data storage computer **18** through the local computer and communication link. In the particular implementation, this involves accessing a home page for the grocery store **2** that is also stored in the data storage computer **18**. To perform this access, the local computer **20** is turned on, the Internet is accessed by conventional Internet access provider, and the address of the home page is

entered (e.g., http://www.abcgrocery.com). A home page **24** such as illustrated in FIG. **3** is then displayed, for example.

From the home page **24** illustrated in FIG. **3**, the shopper can "go shopping" or "make lists" or use a "product locator." These are function selectors designed into the home page which connect the shopper to features of the present invention illustrated in FIGS. **10A–10B**.

Referring to FIGS. **10A** and **10B**, a shopper that "goes shopping" from the home page **24** shown in FIG. **3** can travel through the virtual store, look at specific products, request more information about products, select products for purchase, and make lists. The shopper can also enter order information and print one or more lists.

In traveling through the store, the shopper sees the interior of the virtual embodiment of the store as displayed through the respective local computer **20**. At the beginning of a travel through the store, the display can show entry through the front door of the store, selection of a shopping cart, and movement to a conventional starting point; however, programming can be used to allow the customer to start at any selected point within the environment of the shopping facility **2**. Additionally, programming can allow the shopper to travel down a main aisle and look down each stocked aisle to see images of the products and/or menus of products contained in that aisle. The shopper can then go down each aisle as desired. The beginning of one such stocked aisle is shown in FIG. **4**. FIG. **5** shows another type of display of the aisle including an index **26** of the items in the store, a list **28** of items on "special," and a list **30** of items to be ordered based on a predetermined or a calculated frequency. FIG. **6** shows still another type of aisle display, this one including a menu **32** of products available on that aisle.

In general, traveling through the store involves the programming of one or more of the computers **18**, **20** to determine the location of the shopper, access data, and display the retrieved data. This involves data transfers between the computer **18** and the respective computer **20** whereby the desired data to be displayed is provided to the local computer **20**. One way to determine the location of the shopper in the store is via a cursor **34** displayed on the screen as shown in FIG. **4**. This location of the cursor **34** is oriented relative to the computer program defined three-dimensional space coordinate system set up for the shopping facility and providing one means of identifying the digitally recorded images. Once the shopper enters the shopping facility, the computer **18** or **20** keeps track of where the cursor **34** is located within the virtual three-dimensional space and the computer **18** or causes the associated data within a predetermined region of that location to be displayed, again such as illustrated in FIG. **4** (and FIGS. **5** and **6**). That is, the computer programming can be defined with preset spatial parameters that define the range of x-y-z coordinates to be shown at any given cursor location. This can be a fixed range, or different ranges depending upon the various positions within each aisle, for example, or as otherwise desired.

The present invention also allows for rotational orientation so that if the shopper is in an aisle, looking in a particular direction, the computer **20** displays that view. Such rotational orientation can be implemented using the control means **14** such as specifically implemented by the arrow keys on a keyboard or by a joy stick. Thus, as the shopper travels down the aisle from the end shown in FIG. **4**, different data is retrieved from the computer **18** (or from data previously downloaded to the computer **20**) to show movement along the aisle as indicated by the scene in FIG. **7**. Also shown in FIG. **7** is one technique for identifying to the shopper items to be reordered and on special. Means other than the textual indicators of FIG. **7** can be used; for example, the products can be made to flash or can be highlighted in a predetermined color.

When the shopper stops at a particular section to look at a product, as indicated by left, right, forward or reverse motion such as input through the arrow keys of the keyboard, a more limited, closer view of a section of the aisle can be viewed, such as shown in FIG. **8**. Although not shown in the representation of FIG. **8** due to space and lettering constraints, the individual products, such as product **36**, appear on the display means as replicas of the actual products and include their labeling in sufficient definition that the labels can be read in at least close-up views. Associated with each product or group of like products is the corresponding price and information label **38** also in detail for reading in at least close-up views.

An even closer view is shown in FIG. **9** in association with further information about a particular product and lists generated when products are selected. In FIG. **9**, for example, each of the shelf labels **38** is a "hot spot" which causes a product information window **40** to be displayed when the cursor **34** is placed on the shelf label "hot spot" and clicked on. As shown in FIG. **9**, the information can be visibly shown as in window **40**; however, audible information can also be provided if the computer **20** has a speaker and the data from the computer **18** data base contains data for generating audio output. As another example, the product may be graphically presented in response to actuating the "hot spot"; for example, different discrete views of the product can be sequentially shown in maximum close-up views with sufficient resolution and clarity to allow the shopper to read product labeling. These are examples of implementations of the means for communicating information about a selected product and the means by which that selected product is identified.

To obtain data by which the different views shown in FIGS. **4–9** can be provided, the digital camera **8** can be moved throughout the store to capture all of the images and this raw data stored in the computer **18**. The computer programming is set up to define specific image ranges within each location of the cursor **34** so that under shopper control of the control means **14**, the cursor location within the store can be noted and the images within the appropriate range of that location displayed. As the cursor **34** is moved and other control information given to the computer **18** or **20**, movement along an aisle and zoom in and zoom out views can be shown. Alternatively, discrete segments of the store can be stored in the memory and these discrete segments pulled up and displayed as the cursor **34** reaches appropriate locations within the three-dimensional coordinate system set up for the interior of the shopping facility.

As the shopper moves through the virtual store displayed via the computer **20**, products can be selected for purchase such as by entering data through the product information window **40** as shown in FIG. **9** (i.e., by selecting "yes" after "purchase") or by single or double clicking on the product or the "hot spot" in a distinctive manner from that used for calling up the product information. A selection can then be automatically added to one or more lists, examples of which are shown in FIG. **9**. For example, the lists can be alphabetical (**42**), by store location (**44**), or by warehouse location (or other "order fill" location) (**46**). At least a list such as list **30** also automatically lists the number of items ordered, the unit cost and/or the total for each product, and a running total for the entire list. The programming for the computer **18** or **20** can also allow the shopper to add notes to any of the lists

(e.g., an instruction for the person filling the order regarding what to do if a particular selection is not available); entering a note can be by any suitable means of the system, such as by entering text through the keyboard of the computer **20**.

Once a list has been created for the products to be purchased, the products can be ordered electronically through the Internet system with instructions for delivery by the store or for pickup by the shopper going to the store. Payment provisions (preferably secure ones) can also be included in the system.

If the shopper wants to go to the store and go through the aisles to select the individual items himself or herself, the desired list can be printed (e.g., by selecting the "print" button on any of lists **42**, **44**, **46**) and taken to the store by the shopper.

Returning to the home page **24** shown in FIG. **3**, one or more list forms is displayed at the respective computer **20** if the shopper selects "make list." These can be of the same type shown in FIGS. **5** and **9** and can allow the shopper either to create a current list or to install a reorder list.

Referring to FIG. **10A**, to make a current list, the shopper enters the current date, selects any reorder items from an existing reorder list, enters new items to be selected and then controls the computer **20** to automatically organize in the manner the shopper wants (e.g., by location in the store or by price or alphabetically as illustrated in FIG. **9**) and print the list if desired. The shopper can then end the session or "go shopping" to see if additional items are needed.

To make a reorder list, the shopper enters the current date, the item to be reordered and information regarding the reorder frequency, and stores the reorder list in memory in either the computer **20** or the computer **18**. The list can be printed, and the shopper can then "go shopping" or end the session as desired. An example of a resultant output based on this type of list is shown in FIG. **5** by list **30**, which shows items to be reordered as of the current date. Such a list **30** can be defined by the foregoing to have a predetermined order frequency or a list can be automatically maintained based on actual ordering history (e.g., each time an actual order list is made, the historical list updates and determines ordering frequency such as by computing an average time between purchases of the same product).

The third option shown on the home page **24** of FIG. **3** is to use the "product locator." Details of this are shown in FIG. **10A**. A predetermined directory of all the products available from the store **2** is encoded in digital signals stored in the computer data base of the system such that this directory is searchable by one or more words entered into the computer **20** by the shopper (or other selection technique, e.g., an alphabetical list the shopper scrolls through). The programmed computer **20** with its keyboard (for example) provide means for enabling the shopper to search the defined searchable directory in that the shopper types in one or more words to identify the product to be located (e.g., "green beans"). The system then matches this to the stored directory listing and retrieves and displays back to the shopper through the screen of the computer **20** where the product is located in the store **2**. This can be by a text response (e.g., "aisle **2**") or by displaying the video image of that portion of the store as would be seen if the shopper moved among the virtual aisles. The shopper can select these found items, make one or more lists, and order if desired, all as indicated in the flow chart of FIG. **10A**. The shopper then can print the list(s), "go shopping," or return to the home page **24**, also as shown in FIG. **10A**. Other specific implementations can, of course, be used.

The foregoing defines the preferred embodiment of a computer-implemented method of simulating movement of a shopper through a shopping facility to enable the individual to observe, inspect and select a product in the shopping facility through operation of a computer. Stated another way, this is a method of creating a virtual shopping facility for interactive shopping by computer.

Based on the system described above, this method comprises selecting a physically embodied shopping facility having displays of goods physically disposed therein for the particular implementation of a grocery store, for example. The selected shopping facility has a known configuration via its actual construction and arrangement of products displayed at the selected shopping facility such that a shopper can move among the displayed products to observe, inspect and select from among the displayed products.

The method simulates the configuration of the displayed products in a computer, such as one of the computers **18** or **20**. This includes in the illustrated implementation translating the known configuration of displayed products into encoded configuration-defining electric signals in memory of the computer **18** and using the electric signals to create video representations of the configuration of displayed products through the computer **20** (in another non-limiting example, the signals can be stored on a storage medium used directly in the computer **20**). Conversion of the images of the physically disposed displays of goods into encoded digital signals is by means of the digital camera **8** for the particular implementation of FIG. **2**. The encoded digital signals from the camera **8** are stored in the computer **18** in this implementation. Access is provided to these stored signals such that portions of the signals are selectable and transmissible to the computer **20** for displaying, on a monitor of that computer, virtual movement along the display of goods represented by selected stored encoded digital signals. In the illustrated implementation this uses known Internet communication technology for accessing and transferring the requisite signals.

The shopper using the system and method of the present invention is located at a respective one of the computers **20** and indicates to that computer **20** a first virtual position of the shopper within the displayed shopping facility. This first position is indicated by the shopper controlling the control means **14**, such as a mouse, to place the cursor **34** at a desired location within the displayed video representation of the configuration of displayed products.

The shopper indicates to the computer a continuous change from the first position to a second position. This can be done by moving the cursor **34** along the displayed image. In response the stored data within the predetermined display range of the cursor location is acquired to continuously change the displayed images resulting in displaying through the monitor of the computer **20** a changing video representation of the configuration of displayed products corresponding to a moving scene the shopper would see in moving from the first position to the second position in the actual shopping facility.

The method of the present invention also includes distinctively displaying predetermined ones of displayed products to indicate to the shopper that the distinctively displayed products are offered on a special basis or need to be reordered or are on the current order list, for example.

The method also includes indicating to the computer the shopper's selection of a specific product. This can be by, for example, clicking on the displayed product, or clicking on the displayed product and dragging it to a video represen-

tation of a shopping cart, or answering a selection query in a display window on the screen. Selection can also be by a light pen, screen touch, keyboard actuation or other means. When a product is selected, it is automatically added to the selected product list.

The invention also includes maintaining in the computer a historical list of products selected by the shopper.

From the product selections, a list is created in the computer **18** or **20**, which list contains the products to be purchased by the shopper at the actual selected shopping facility. The list can be organized in a sequential order in which the selected products are to be picked up at the actual selected shopping facility or at another location such as a warehouse where electronically transmitted orders are filled. Other list organizations can be used.

When the list has been completed, it can be printed for the shopper to use when the shopper goes to the actual selected shopping facility, for example.

As mentioned above, the hardware and software for implementing the system and method described above are in general conventional and known in the art. To the extent any modifications or additional hardware or software is needed in specifically implementing the invention, such modifications and additions are within the skill in the art given the explanation of the invention set forth above.

Thus, the present invention is well adapted to carry out the objects and attain the ends and advantages mentioned above as well as those inherent therein. While preferred embodiments of the invention have been described for the purpose of this disclosure, changes in the construction and arrangement of parts and the performance of steps can be made by those skilled in the art, which changes are encompassed within the spirit of this invention as defined by the appended claims.

What is claimed is:

1. A food vending method, comprising:

maintaining an actual operating food vendor at a physical location, the food vendor having a customer service area;

converting at the customer service area actual images of the customer service area and food served therein into encoded digital signals;

storing the encoded digital signals in a computer storage medium; and

providing for remote computer communication link access to the stored encoded digital signals such that transmissions over the communication link responsive to the stored encoded digital signals display on a monitor of a computer at a location remote from the physical location of the food vendor a continuous motion visual representation of movement and food within the customer service area enabling a person viewing the monitor to have a visual experience of walking in the customer service area of the actual operating food vendor, sitting down at a table, and opening a menu as if the person were in the physical location of the actual operating food vendor.

2. A method as defined in claim **1**, wherein:

converting actual images of the customer service area includes converting an actual image of a menu used in the customer service area; and

the continuous motion visual representation includes the actual image of the menu.

3. A method as defined in claim **2**, wherein the food represented in the continuous motion visual representation appears in response to selecting at the computer the respective food item from the actual image of the menu in the continuous motion visual representation.

4. A method as defined in claim **2**, further comprising transmitting an order for food from the computer to the food vendor over the communication link.

5. A method as defined in claim **3**, further comprising transmitting an order for food from the computer to the food vendor over the communication link.

6. A method as defined in claim **3**, wherein the selected food representation appears in continuous motion showing the selected food being served at the table.

7. A method as defined in claim **1**, wherein the continuous motion visual representation further enables the person viewing the monitor to have a further visual experience of seeing a food item being served to the displayed table after the person has selected the food item from the opened menu.

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